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RHODESIA

REPORT

of the

SECRETARY

to the

MINISTRY OF AGRICULTURE

For the period
1st December, 1963 to 30th September, 1964

Presented to the Legislative Assembly 1965

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REPORT OF THE SECRETARY TO THE MINISTRY OF AGRICULTURE

(which includes the Economics and Marketing Branch, Co-operatives and Loans Branch, the Departments of Research and Specialist Services, Conservation and Extension and Veterinary Services).

FOR THE PERIOD 1st DECEMBER, 1963 TO 31st DECEMBER, 1964.

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Report of the Secretary for Agriculture

for the period 1st December, 1963 to 30th September, 1964

GENERAL

THE PERIOD covered by this report has been a complex one.

On the 1st December, 1963, full control and responsibility for the following agricultural services were resumed by the Rhodesia Government from the Fedreal Government:

Research and Specialist Services.
Conservation and Extension.
Veterinary Services (including Tsetse and Trypanosomiasis Control).
Tobacco Research Board.

On the 1st January, 1964, all agricultural marketing services reverted to the Rhodesia Government. This involved the transfer of the following:

Economics and Marketing Branch.
Cold Storage Commission.
Grain Marketing Board.
Dairy Marketing Board.
Tobacco Export Promotion Council.
Tobacco Marketing Board.
Pig Industry Board.

Thus it was that from the 1st January, 1964, all aspects of agriculture—production, research, extension, animal health and marketing—covering farmers of whatever race, came under the aegis of one ministry. The one exception in the marketing field was that the co-operative movement remained with the Ministry of Internal Affairs until 30th June, 1964. The Ministry of Agriculture took it over with effect from 1st July, 1964.

The Natural Resources Board moved across from the Ministry of Lands and Natural Resources to the Ministry of Agriculture during May, 1964. This move was welcomed by all concerned and served to strengthen the already very strong bonds between the Board and this Ministry.

The task of reorganizing the Ministry on its new and expanded basis was a mammoth one. It will be readily appreciated that, in the early stages, many of the staff were in an unsettled state and wondering just where and how they would fit into the new organization—or, indeed, if there would be a place for them at all. These difficulties were all overcome and at the end of the year the Ministry had settled down and was functioning as a cohesive unit.

In addition there was a keen and understandable interest on the part of the Rhodesia National Farmers' Union as to the shape, size and quality of the new Ministry.

As part of the task of reorganization the Public Services Board undertook inspections into the grading and structure of the Veterinary Department, the Department of Research and Specialist Services and the Department of Conservation and Extension. The exercise was completed in respect of the Veterinary Department, at least as regards the professional staff, but the remainder of the Ministry still awaits finalization. The time taken over this exercise has, in many instances, had an unsettling effect on members of staff.

On the marketing side the Rhodesia Government took over the pricing agreements made by the Federal Government with the Rhodesia National Farmers' Union in respect of cattle and milk. The Maize Price Agreement had been terminated by the Federal Government, but the *ad hoc* pricing arrangements for the 1963–64 crop made by the Federal Government were taken over *in toto*. The Federal Government had also referred to the Rhodesia Government the reports of the commissions of inquiry into the beef cattle industry and the maize and small grains industry. There was a feeling of uncertainty amongst producers about future marketing arrangements for their major crops which was voiced by the President of the Rhodesia National Farmers' Union at the 1964 Rhodesia National Farmers' Union Congress.

Discussions with producer representatives have since been concluded on the recommendations in the reports of the commissions of inquiry and the position is now as follows:

Cattle.—A revised grade and weight price schedule has been drawn up which will giv the producer an average increase of 10s. per 100 lb. c.d.w. for cattle delivered to the Col Storage Commission as from the 1st January, 1965. The incidence of this increase is suc as to give an incentive to production of the higher grades and more beef.

Maize.—An interim pricing arrangement has been agreed to for the 1964–65 harve under which producers will receive for maize sold on the internal market a sum equal t the Grain Marketing Board's selling price on the internal market, less costs and net realiza tion for exports. The Ministry is seeking authority for the grain marketing legislation to b rewritten in its entirety.

Milk and Dairy Products.—The dairy industry gives cause for concern. The proportio of milk used in manufacture has increased and this has resulted in lower net realizatio per gallon to the producer. At the same time Government has not found it possible continue the rate of subsidy applicable in the past. An interim arrangement has been mad under which the producer will continue to receive an average of 46.5d. per gallon for mi consumed as whole milk and 21d. per gallon or the 1963–64 net realization, plus 0.4d. p gallon, whichever is the higher. The Dairy Marketing Board has been given sole importin rights for skim milk powder in bulk and a high tariff has been placed upon imports of ski milk powder in small lots. The Board's selling price of skim milk powder has been increase to 1s. 9d. per lb. (1s. 3d. roller), and Government has agreed to pay the sum of £51,000 the Board as a subvention. These arrangements terminate on the 30th June, 1965, and the meantime the Ministry is discussing future long-term arrangements with produc representatives.

A major development during the year was the creation of the Agricultural Loan Fund f the express purpose of making credit available to African farmers.

The inability of the African farmer to obtain credit in the past has been probably t greatest obstacle to increased production on his part. It is true that funds have been advanc from the African Development Fund, but this was on a small scale. Credit is made availab from the Agricultural Loan Fund mainly on the basis of a character assessment. It advanced in kind as opposed to cash and it is being continually stressed that, in borrowin a borrower assumes the obligation to use the loan for the purposes for which it has be advanced, and that it must be repaid. The Government is, however, well aware of the fact th education must go hand in hand with credit and that there is a fair measure of financial ri involved in its credit venture.

The fund is administered by the Ministry but as it grows, it may be necessary to cre a specialized organization or to adapt an existing one to take over the fund.

It is, of course, very easy to advance credit. It is another matter to recover sums owi The Agricultural Loan Fund was created with the expectation that a district accounting serv would be instituted. There are not only delays in this, but a doubt if one will be created at a The Ministry can only view this situation with the gravest concern, since responsibility collection and accountability for losses lie with it.

As mentioned earlier, the Ministry assumed responsibility for the co-operative movem with effect from the 1st July, 1964. This transfer has been warmly welcomed by us and toc all aspects of agriculture have been brought together in one Ministry. This will lead improved co-ordination and efficiency.

AGRICULTURAL PRODUCTION COMMITTEE

Following a statement in the Legislative Assembly by the Rhodesia Minister of Ag culture in September, 1963, the Agricultural Production Committee was formed during early days of October, and met for the first time, under the chairmanship of Mr. N. Cambit on the 5th November, 1963.

As an advisory body only, the committee's main function is to co-ordinate all aspe relating to the agricultural production drive as they impinge upon Government and n Government interests.

The committee was initially representative of all interests, both Government and non-Government, which were in any way connected with the agricultural industry, and numbered 21 members. During the course of the year, however, it became increasingly apparent that the need for the numerically large membership of the committee was falling away as the field organization of the production drive became progressively more effective. Finally, early in September, 1964, the Minister of Agriculture decided to replace the committee as originally constituted with one made up of representatives from the Ministry of Agriculture, the Rhodesia National Farmers' Union, the African Farmers' Union and the Chairman of the Natural Resources Board. The reconstituted committee remained under the chairmanship of Mr. Cambitzis and its terms of reference were unchanged. Attendances at meetings were exceptionally good, and much useful discussion took place as the result.

Early on in its deliberations, the committee established that no production drive could succeed unless it was backed by an organization in the field which was in touch with the farmers themselves. With organizations already in existence in the form of intensive conservation area committees, intensive conservation group committees and farmers' associations, it was decided to build on these, and groups were therefore invited to form themselves, in collaboration with local farmers' associations, into regional production committees. This has been done in many areas but where production committees have not been established the group committees themselves handle production matters. Similar organizations have been set up to cater for the African Purchase Area where, as also in the tribal areas, the initiative and drive on production matters is the responsibility mainly of Conservation and Extension staff in the area. Communications between the Agricultural Production Committee and the farmer are channelled through the regional organization and, in effect the committee's mouthpiece and right arm is the regional committee. In the main, the organization has worked successfully, though it must be admitted that the necessary drive and enthusiasm have not always been very apparent in some areas.

As to achievements during the year, attention was concentrated chiefly on beef production and the needs of sound planning for agricultural production. The committee has always taken the view that it is not practical for it, based in Salisbury, to tell farmers what to grow, in their own areas. The initiative and the forward planning must come from the farmers themselves, for only they know what their potential is and how it can be related to profitability. The principal achievement, therefore, which can be credited to the committee, has been its creation of an awareness of the need for the agricultural industry to produce more, in the national interest, of all products which farmers can produce at a profit and for which markets are available, and the stimulation, through the regional committees, of development by means of forward planning. In this latter connexion, all regional committees were invited, in February, to prepare production plans for their areas. The response, though by no means universal, has been most encouraging, and clearly points to the fact that many farming areas are co-operating in the production drive. The success has, in no small way, been due to the personal contacts made by the committee's chairman during the course of numerous attendances at meetings of farmers throughout the country.

Throughout the year, the committee also dealt with what may be regarded as "bread and butter" matters where it has, with varying degrees of success, used its influence to solve problems of individuals and of committees.

It can be said that, in most parts of the country, the year has seen a genuine growth amongst farmers of the desire to accept the Minister of Agriculture's call for increased production, an achievement which, unfortunately, has been limited by the drought conditions experienced during the 1963–64 season and which has been, and will continue to be, affected by difficulties of access to finance for development.

FREEDOM FROM HUNGER CAMPAIGN COMMITTEE

The Rhodesia Freedom From Hunger Campaign Committee was formed towards the end of January, 1964, under the chairmanship of Mr. L. T. Tracey, O.B.E., M.C., formerly a prominent farmer, an author on agricultural topics and agricultural adviser to the Rhodesian Selection Trust group of companies. Its membership consists of a number of private individuals

who are concerned in one way or another with welfare work, a representative of the churches and representatives from the Government ministries which are responsible for agriculture, health, education and information.

The committee met for the first time on 13th February, 1964, when it had the good fortune to meet the Rt. Hon. Earl de la Warr, chairman of the United Kingdom Freedom From Hunger Campaign Committee. Regular meetings were held during the period under review, whilst two sub-committees dealing with projects and with public relations aspects were set up and did good work. The committee were also given the opportunity, in April, of meeting Mr. T. F. Betts, field director of the Oxford Committee for Famine Relief in Southern Africa.

During the early stages of its life, the committee devoted its time to an examination of a number of projects directed towards the attainment of its principal objective of relieving and eliminating malnutrition which is known to exist in the country. It became apparent very early on that the committee's task would not be achieved merely by sponsoring projects for overseas or local financial support but a massive "education" drive would be required, as well, to bring home to the under-privileged the essential need to improve their living standards and to create an awareness amongst those more fortunate of the fact of malnutrition and of their duty to help remove it. To mount and sustain such a campaign of education would require the full-time services of someone. The State Lottery Trustees were approached for funds to support organizational expenses, and they very generously donated £2,500. Accordingly, the committee appointed a campaign director on 1st June, 1964.

Of the projects examined by the committee an initial three were considered suitable for sponsoring for overseas fund-raising and were forwarded, during May, to the United Kingdom Freedom From Hunger Campaign Committee for financial backing. Subsequently, the committee also backed applications received from the Federation of African Women's Clubs and the Federation of Women's Institutes for transport facilities to assist them in their educational work.

By the end of September no advice had been received from the United Kingdom as to the success or otherwise of the various projects.

Following the appointment of the campaign director, the committee moved ahead with its endeavours to bring the purpose of the campaign to the notice of the people of Rhodesia. The committee had been honoured by the acceptance, by His Excellency the Governor, of patronage of the campaign and His Excellency formally launched the campaign at a large gathering in Salisbury on 30th July, 1964. The formal ceremony preceded the display of a Freedom From Hunger exhibit at the principal agricultural shows during August and September.

The opportunity was taken, at the agricultural shows, by the committee's chairman and the campaign director to discuss with prominent people in the various centres the possibility of establishing regional Freedom From Hunger Campaign committees. The purpose of establishing such organizations throughout the country lay in the fact that local problems could only properly be tackled by the people closest to the problem, thus leaving the national committee to handle the truly national problems. By the end of September, little progress had been made in setting up regional bodies but much interest was shown in a number of places, which augured well for the future.

Steps were taken, through the press, on radio and on television, to publicize the campaign. It was anticipated that the arousing of the public conscience would take time, but it can be said that the seed has been sown. A fund-raising campaign had still to be mounted, but the seed bore fruit in the form of a few donations which, it is expected, will increase as the campaign grows during the next year or two.

The Freedom From Hunger Campaign within Rhodesia forms only a small part of the world-wide effort mounted by the United Nations Food and Agriculture Organization, in 1960. Although we have been in the field for such a short while, the campaign shows promise of very considerable support throughout the country, with a potential for goodwill and effort which should not go untapped.

CROP PRODUCTION

Tobacco

Flue-cured

Climatically the season was unfavourable, with conditions affecting the quality of tobacco. Flue-cured tobacco yielded an estimated 1,194 lb. per acre, and with an additional 35,000 acres planted compared with the 1962–63 crop, an all-time record crop of 301,975,000 lb. (Rhodesian production) of tobacco was marketed at an average price of 25.80d. per lb. This resulted in a gross return to growers of £32,465,000, but at an average estimated profit of only £5–£6 per acre. In order to prevent future over-production, the Rhodesia Tobacco Association has introduced a voluntary market quota scheme for the 1964–65 season, which will be backed by legislation, if necessary. An essential feature of the scheme will be the destruction of any tobacco in excess of the quota which may be fixed.

The very large crop was successfully marketed and several new markets were entered, probably because of the availability of good-quality tobacco at prices well below normal. The United Kingdom continued as the principal market for Rhodesian tobacco, and purchases amounted to 120,765,000 lb., an increase of some 13,000,000 lb. over 1963.

Buyers' declarations of destination show the following allocation of the crop:

SOUTH WESTERN AREA — RHODESIA AND ZAMBIA

	lb.	*per cent.*
United Kingdom	120,765,252	37.29
Australia	7,497,833	2.32
Republic of South Africa	8,202,261	2.53
Local market	13,191,440	4.07
Other markets	174,088,162	53.76
Unallocated	90,885	.03
	323,835,833	100.00

During February, 1964, discussions were again held in Salisbury between officials of the American and Southern Rhodesia governments, together with tobacco trade representatives. It was apparent from these talks that the Americans intended to maintain their hold on tobacco markets. Of worry to Rhodesia was the accumulation of flue-cured tobacco in America. Their stockpile is 1,000,000,000 lb., which compares with a world export trade of approximately 800,000,000 lb.

Burley

This year, for the first time, formal marketing arrangements were introduced for this crop, and it was sold over the Salisbury auction floors under the same conditions as those appertaining to the flue-cured crop. From 2,680 acres, 2,528,260 lb. were produced and sold at an average price of 28.76d. per lb. Providing the quality of the Rhodesian crop can be maintained there are strong indications that markets can be found for a crop of 5,000,000 to 6,000,000 lb.

Turkish

This year a crop of approximately 1,400,000 lb. was produced from an estimated 2,200 acres and sold at an average price of 35.68d. per lb. Potential markets exist for the annual sale of from 10,000,000 to 15,000,000 lb. of Turkish tobacco, and production continues to expand. This year sales were made at a privately operated and financed sales floor in Bulawayo. Buying was on a competitive basis, but there were only a few buying organizations and turnover is at present the limiting factor. At the end of the year a working party, consisting of officials, growers, buyers and statutory marketing organizations, was set up to investigate the need or otherwise for the introduction of formal marketing arrangements for this crop.

Maize

An early end to the rains, with dry conditions at the critical cobbing stage, resulted in depressed yields this year. Farm production and deliveries of the crop to the Grain Marketing Board were estimated as follows:

	Bags	*Acres*
European production	4,400,000	385,000
Less farm retentions	2,000,000	
European deliveries	2,400,000	
African deliveries	500,000	
TOTAL DELIVERIES	2,900,000	

Deliveries up to the beginning of December have totalled 2,750,000 bags, of which only 250,000 bags came from African producers.

The final payout of 1s. 7.2d. per bag in respect of maize deliveries from the 1962–63 crop gave a producer price of 39s. 10.208d. per bag.

Pricing arrangements in respect of the 1963–64 crop were made following agreement between the then Federal Government and the Territorial governments.

Under the arrangements certain assurances (as quoted in last year's report) were given to producers, including a limitation of £300,000 for subsidy, and an initial payment of 35s. per bag was announced. To date a supplementary payment of 1s. per bag has been made.

The recommendations of the Commission of Inquiry into the Maize and Small Grains Industry of Northern and Southern Rhodesia are still under consideration. Pending final decisions an interim arrangement was entered into with producers in connexion with the pricing of the 1964–65 crop. This was as follows:

(a) For maize sold by the Grain Marketing Board for consumption on the internal market, the producer will receive a sum equal to the Board's current selling price of 41s. 9d. a bag, less the Board's costs. At present these are approximately 5s. 9d. per bag. Any savings due to the size of the crops or achieved by the Board will benefit the producer price.

(b) For maize which is exported, the producer will receive net realization value.

(c) If in the interest of the maize industry some price support is desirable, Government will provide this up to a maximum cost of £250,000.

(d) That if the season is such that imports might be necessary, any financial implications will not be for the account of the producer.

Owing to the inaccuracy of producers' estimates on the 1962–63 crop a year earlier, over-export took place and imports of 550,000 bags were made from South Africa. Some of these imports were brought in to carry the Board through until the 1963–64 crop became available.

Present indications are that the acreage to be planted to maize in 1964–65 will be the highest ever, and prices on the export markets are moving favourably at present. Difficulty was experienced in meeting the demand for seed maize, and imports of hybrid seed had to be made from South Africa.

Given average seasonal conditions it is a fact that maize production will continue to meet local requirements and, in addition, result in an exportable surplus. Whilst it is still to early to assess the effects of the revised cereal import policy introduced by the United Kingdom from July, 1964, it appears that as a signatory to the agreement to abide by the new regulations related to this policy Rhodesia should be assured of a market in that country. However, it is essential, with world demand for white maize being limited, that other markets be found and supplied. The overseas markets for yellow maize are substantial and research into the production of high-yielding yellow hybrid maize seed has continued.

Groundnuts

Prices payable for the 1963–64 crop were as follows:

Shelled Groundnuts	*Per Standard Bag*
	s. d.
Class S	85 0
Class A	81 0
Class B	78 0
Unshelled Groundnuts	
Class A	17 10
Class B	16 11

The estimate of intake by the Grain Marketing Board is put at 350,000 bags, and up to the beginning of December approximately 320,000 bags had been delivered. The estimate shows an increased crop over that of 1961–62, but a fall from that of 1962–63.

The following table indicates the level of groundnut production by Europeans and sales by Africans over the last few years:

Crop year (*Oct.–Sept.*)	*Intake year* (*May–April*)	*European production* '000 *bags*	*African sales* '000 *bags*
1959–60	1960–61	10	82
1960–61	1961–62	18	190
1961–62	1962–63	17	319
1962–63	1963–64	30	363

Source: Grain Marketing Board Annual Report, 1963–64.

By and large the major increase in production has come from African farmers, for whom in 1964 it was the most important cash crop. Although production from European farmers shows an upward trend, it is still well below that of Africans. Encouragement continued to be given to groundnut production by way of guaranteed preplanting prices which, with the elimination of Class S are 86s. per bag for Class A and 78s. for Class B for the 1964–65 crop season. An additional inducement to production in the African Purchase Area is that the Development Fund Levy is to be suspended.

It was unfortunate that with increased demand on world markets the seasonal effects on local production did not allow advantage to be taken of these favourable conditions, although exports were made to Zambia. Indications are that, given average seasonal conditions, this crop will play an increasing role in the cash economy within the European and African farming sectors and as a source of foreign exchange to the country as a whole.

For the future, it has been decided to concentrate on the production of a "Rhodesian" nut rather than a mixture of varieties. The extension services, in collaboration with the Grain Marketing Board, are putting this into effect.

Munga and Grain Sorghums

The report of the Commission of Inquiry into the Maize and Small Grains Industry recommended the decontrol of these grains, but it was agreed that for the 1963–64 crops control would remain in force. Control of munga is to be removed for the 1964–65 crop, but grain sorghums will remain under control. Producer and selling prices for these grains from the 1963–64 crop are shown in the following table:

	Producer Price per bag	*Selling Price per bag*
	Class AB	Class ABS
Munga	31s.	36s. 9d.
	Class A	Class AS
Grain Sorghums	32s.	36s. 9d.

Production of both grains is largely in the hands of African farmers, although there is some interest in the production of grain sorghums in the European farming sector. Deliveries to the Grain Marketing Board of these grains over the last few years have been as follows:

		Munga		*Grain Sorghums*	
Crop year (Oct.-Sept.)	*Intake year (May-April)*	*European Sales*	*African Sales*	*European Sales*	*African Sales*
		bags		bags	
1959–60	1960–61	22	14,630	8,520	32,817
1960–61	1961–62	297	95,722	51,208	134,238
1961–62	1962–63	239	57,391	52,251	90,468
1962–63	1963–64	—	9,081	35,725	51,730

Source: Grain Marketing Board Annual Report, 1963–64.

Local demand for munga is small, and whilst fortuitous export markets may occur from time to time, export possibilities are poor. Deliveries of this grain have shown a marked falling off in recent years and indications are that intake from the 1963–64 crop will be the lowest for many years.

The local market for grain sorghums is made up of the demands from the brewing and stockfeed industries. Demand is limited and though an export market exists for the grain, world demand is for a pure variety. South African grain sorghums were recently quoted on the London market at £22 15s. 0d. per long ton c.i.f. To enter overseas markets at reasonable prices, which would, however, be at a discount to maize, will necessitate the production of suitable pure varieties in adequate quantities. Steps are being taken to this end.

Cotton

Although the cotton crop was adversely affected by the prevailing climatic conditions over the 1963–64 season, production was nearly double that of the previous year. A pre-planting price for the 1964–65 season of 8d. per lb. for A grade cotton has been announced, and seed sales indicate that a crop of between 30 and 50 million lb., depending upon the season, can be expected. Prospects for export are good.

Production of seed cotton over the past few years has been:

Crop year ending 30th September	*European* lb.	*African* lb.
1960	1,715,000	260,000
1961	2,528,000	456,000
1962	879,000	407,000
1963	7,137,000	857,000
1964 estimate . .	14,900,000	

Source: Cotton Marketing Committee Report, 1964.

Marketing of the crop continued to be the responsibility of the Grain Marketing Board as agent of Government. A Cotton Marketing Committee was set up by the Minister as advisory to him. The committee was comprised of representatives of the Grain Marketing Board and industry and did sterling work in fostering the production and orderly marketing of the greatly increased crop. Ginning operations on the crop were handled by Rhodesian Spinners Ltd., under the agreement between this concern, Government and the Grain Marketing Board. Additional ginning capacity has been installed at Gatooma to handle the increased crop and the Government has plans to erect a further gin of some 20 million lb. capacity to be ready for the 1965–66 crop. Thereafter, another gin in the cotton areas will be required. The present output of the lowveld does not justify a ginnery as yet.

The producer prices for seed cotton were as follows:

Class A	8d. per lb.
Class B	6¾d. per lb.
Class C	5d. per lb.

Wheat

Research into, and the development of, high-yielding varieties suitable for local conditions continued, together with progress in determining ways and means of overcoming the problem of weeds, especially in respect of summer wheat. Wheat production also plays an important role as a complementary crop in irrigation rotations.

Local production of wheat only accounts for some 2 per cent. of the requirements of the country, and imports are running at well over £1.5 million annually, so it would be in the interest of the country if production could be stepped up at reasonable price levels, in order to reduce the dependency on imports.

The informal pricing arrangement with the milling industry continued to operate and producers received a price of 60s. per bag delivered at the mills. This price is about 5s. per bag above import parity.

Barley

The 1962–63 winter barley crop showed a marked increase over preceding years, reaching 23,000 bags from 1,600 acres, giving an acre yield of 14.4 bags. Indications are that the 1963–64 crop will substantially exceed this figure. The main market for this cereal is provided by the brewing industry, but this outlet is restricted due to limited malting capacity. Outside the brewing industry the market is extremely small. Government continued in its efforts to get the local malting capacity expanded.

As in past years, the breweries advertised for supplies on a contract basis and prices paid this year were as under:

Grade 1	50s. 0d.	per 150 lb. bag f.o.r. sender's station
Grade 2	47s. 6d.	
Grade 3	45s. 0d.	

In addition, the breweries supply seed and bags free to the producers.

Coffee

Coffee production continued to find favour amongst producers in the Eastern Districts. A coffee growers' association was formed, and the Rhodesia Coffee Growers' Co-operative has been registered, with a view to operating a central processing mill. Besides Government's part in providing the services of a coffee specialist and undertaking research, the Industrial Promotion Corporation of Rhodesia and Nyasaland Ltd. was instrumental in providing capital for the development of a 250-acre coffee estate.

Coffee samples sent for consideration to markets in London, Hamburg and Johannesburg have been well received. Provided a high quality can be maintained, overseas markets can prove a profitable outlet, and Government intends to encourage coffee production.

Tea

The growth of the area planted to tea in the Eastern Districts continued, reaching 6,250 acres. Production was of the order of 3.5 million lb. The local market continued to be the main outlet although exports on an increasing scale are taking place. Prices received on the London market were satisfactory and compared favourably with prices obtaining in respect of other African teas. There are seven tea estates under European ownership and in addition there are nine African producers of tea, and a number have already made their first deliveries to the processing factory. The success of this venture will, it is expected, lead to substantial numbers of further producers entering this field.

Soya Beans

Provision was made for the Grain Marketing Board to act as a residual buyer at a price of 45s. per bag, adjusted for transport differentials for each intake point. Although results of this guaranteed market have been poor it is too early as yet to assess the future position. For the 1964–65 crop the board will continue to act as a residual buyer, at a price of 50s. per bag adjusted for transport differentials.

Only a limited local market exists for soya beans so that an increase in production on any scale will necessitate export. Prospects on the export market are good, but it is apparent that before advantage can be taken of this outlet yields per acre will have to be stepped up considerably. In this regard research into the breeding of high-yielding varieties suitable to local conditions has continued, along with emphasis on improved cultural practices

Sunflower Seed

Although no special marketing arrangements exist, a good local demand exists for seed by the expressing industry. The price offered by expressors was about 30s. per bag of 125 lb

Castor Beans

Production of this crop has fluctuated widely over recent years. A reasonably good demand for this crop exists locally, a demand which continues to be unsatisfied. Export prospects are good for quality beans and with an offering price by local concerns of 62s. 6d. a bag of 150 lb., subject to quality standards, it is hoped that this will give an incentive to production. Experimental work on higher yielding varieties and cultural practices continued.

Onions

Local production is able to meet demand over most of the year. Protection is afforded to producers by import permit control over the period August to January and by a tariff in February. Imports of pickling onions are necessary throughout the year, and whilst the demand is not large it should be possible for local production to meet these requirements at certain periods of the year. With the new hybrid varieties of onions now being grown it is evident that local production can meet requirements outside the present control period

Potatoes

Given average seasonal conditions production is such as to meet local requirements, and producers are protected by import control. Export markets exist in neighbouring territories at certain periods of the year, but entry to these markets is dependent on quality and price. The use of certified seed is important, and in this regard production of seed potatoes locally is such as to eliminate the necessity for imports. Export of seed potatoes on a limited scale has taken place.

Pulses

A ready internal market, which is protected, exists for certain varieties for the ration trade and canning industry. In addition, export opportunities exist. Both these markets are being exploited, but it is evident from the two-way trade in pulses that markets are selective in the varieties required. Encouragement is being given to the production of specific types and varieties.

Fruit

Deciduous fruit production continued to expand from existing plantings and from new plantings, especially in the main production area centred in the Eastern Districts. Marketing arrangements continued as in previous years, as it has been decided that the present size of the deciduous fruit industry does not warrant a board. Increased consignments of peaches and avocado pears were air-freighted to the United Kingdom successfully, and it is expected that this traffic will continue on a greater scale. In anticipation of the increased movement of perishables by air, regulations have been introduced to control the quality and packing standards of exports. With increasing demand on the local market for fresh fruit, both for consumption and processing, prospects for further expansion of the industry appear good.

Citrus production showed an increase, with the levels of exports of fresh fruit and fruit juices reaching new heights. In the lowveld canning of grapefruit commenced. The local market was able to draw the major part of its supplies from producers during the production season, although it was necessary at times to augment the supply by imports. This was especially the case in respect of naartjies for the fresh fruit market and grapefruit for processing.

Local production of bananas was far short of consumption, with imports making up the shortfall. Local ripeners will purchase at agreed prices, and with protection afforded to the local market producers should aim to decrease the dependency on imports.

Expanding production of grapes for the fresh fruit market and for the infant wine industry continued, but there remains room for further expansion to meet local needs. Investigation into the establishment of a winery is being undertaken and provided a venture of this nature can be founded on a sound basis should do much to encourage local viticulture.

Vegetables

Fresh vegetable imports until September, 1964, were valued at some £16,000. Whilst it is probable that, due to seasonal factors, self-sufficiency cannot be attained, it is evident that opportunity, under the present system of local market protection of 1d. per lb. on imports, exists for part of these imports to be replaced by local production. Exports of fresh vegetables by air to the United Kingdom were valued at some £6,000 in the first nine months of the year, whilst dehydrated vegetable exports were valued at some £61,000, of which some £43,000 were to the United Kingdom. It appears that with increased air-freight and handling facilities an increase in fresh vegetable export can be expected.

Vegetables and Flower Seed

The country is ideally suited for the production of vegetable and flower seeds and encouraging results have been obtained in the export of these commodities. Seed bean production is being fostered in both the European and African sectors, together with the production of other seeds such as tomato, lettuce and zinnia. Seed growers' associations exist to assist producers, and given care and attention from growers there seems no reason why the production of seeds should not prove a continuing success.

Sugar

With the attainment of self-sufficiency and a continuing increase in production the securing of additional export markets has become a necessity. In order to ensure a continued opportunity for the industry Government has made application for membership of the International Sugar Agreement and is endeavouring to participate in the Commonwealth Sugar Agreement. This has become increasingly important, following on the rapid fall in sugar prices on the world market during the past six months to levels more nearly approaching (but still above) those ruling until mid-1962.

LIVESTOCK PRODUCTION

Cattle

In spite of the decrease in the national herd in 1960 due to severe drought conditions, the cattle population in 1963 had increased to the highest ever. Slaughterings, which exclude slaughterings for subsistence in the African areas, reached a new peak during 1963. Cattle holdings and slaughterings over the past five years are shown in the following table:

CATTLE HOLDINGS AND SLAUGHTERINGS
(excluding subsistence slaughterings in African areas)

	('000)			
Year ending		*Holdings*		
30th September	*European*	*African*	*Total*	*Slaughterings*
1959	1,553	2,093	3,646	346
1960	1,552	1,954	3,506	357
1961	1,599	1,988	3,587	342
1962	1,626	2,091	3,717	352
1963	1,624	2,227	3,851	368

Source: Central Statistical Office Report on Agricultural Production, 1963.

The total number of cattle sold at African cattle sales during 1963 was 68,681, compared with 73,463 in 1962. During the period 1st January to 30th September, 1964, a total of 90,332 head were sold.

Whilst the above figures show an encouraging trend, nonetheless development within the industry has been slow when viewed in the light of the suitable conditions which prevail for cattle production in the country and the favourable export opportunities which exist and are expected to continue.

The Report of the Commission of Inquiry into the Cattle Industry (C. Fed. 267) was submitted in November, 1963. The report broadly endorsed Government's policies for the cattle industry. It is considered that there was considerable room to improve the efficiency of production through improved management, nutrition and additional finance. In marketing, the report considered that the free-enterprise system should continue, underpinned by guaranteed markets and prices at the Cold Storage Commission; that the primary aim of production should be first to satisfy local demand and thereafter meet the requirements of an expanding export trade; and that the central role of the Cold Storage Commission demanded its continued operation at high efficiency for the overall good of the industry.

Government is still considering the detailed recommendations of the report.

Following the termination of the Cattle Prices Agreement on the 31st March, 1964, the Southern Rhodesia Government agreed that the producer price schedule operative over the 12 months to the 31st March, 1964, should continue to operate until 31st March, 1965. However, following investigations into the cattle industry it was then announced that from the 1st January, 1965, an overall average increase of 10s. per 100 lb. cold dressed weight will be paid to producers. This price increase will be spread over the grades as follows:

	New Average Producer Price	*Increase Over Previous Price*
	s. d.	*s. d.*
Rhodesia's Best (4-tooth—previously 6-tooth) . .	184 6	12 7
Imperial	170 0	16 2
Standard A	153 0	14 11
G.A.Q.	127 0	9 3
F.A.Q.	116 0	5 10
Compound	101 0	4 7
Inferior	64 0	nil

This incentive should encourage producers to make greater efforts towards higher quality and increased production, and the price schedule has been particularly designed to have that effect.

With the increased price differential between the high and low grades the operations of the Cold Storage Commission, which is the mainstay of orderly marketing for the cattle industry, could be placed in jeopardy if it did not receive a fair run of the grades of cattle on offer. Such a position could also adversely affect those butchers buying direct from the Commission, as distinct from those purchasing on the open market. In order to correct the position, if necessary, it is intended to introduce legislation giving power for the imposition of a levy on the lower grades of cattle purchased by butchers on the open market.

During its financial year ending the 30th June, 1963, the Cold Storage Commission operated at a profit of £214,022, compared with a profit of £39,801 over the previous year. It is expected that trading results for the year to the 30th June, 1964, will show a profit of some £300,000. Cattle slaughterings over this latter period amounted to some 269,000 head; compared with 256,000 during the previous year.

Exports of fresh, frozen and chilled beef during 1963 amounted to some 13,000 tons, compared with some 9,500 tons during 1962. In the first nine months of 1964, exports amounted to some 11,750 tons. The main market for exports continued to be the United

Kingdom, although this year markets have been opened with success in both Italy and Switzerland, and it is expected that during 1965 further Continental markets will be opened to our beef exports. Increasing use of the port of Beira was successfully made for beef exports, due to the excellent co-operation between the Commission and railway and port authorities. Fullest co-operation from the South African Perishable Products Control Board in the allocation of refrigerated shipping space continued to be received.

Pigs

Self-sufficiency in pig products was maintained, and an increasing quantity of pork products, especially bacon, was exported. The United Kingdom and South Africa were the largest markets, and a new market was opened in Aden. With increased production and a limited local market the opening of new markets and the fostering of traditional markets becomes a necessity if the industry is to go ahead.

Pig slaughterings in 1963 reached a new peak of some 139,000, and indications are that this year this figure will be exceeded. Slaughterings in the main were by Colcom Products Central Co-operatives Ltd., which buys all pigs offered to it at minimum prescribed prices on a grade and weight schedule. During the year there has been an increasing demand from butchers for X grades, and Colcom has had to raise the prices for this grade to maintain its share of the supply.

Dairy

Despite a season which was difficult climatically, milk production continued to increase. This expansion was largely accounted for by deliveries of whole milk to the Dairy Marketing Board. Intake by the Board in the twelve months ending 30th September, 1964, amounted to 16,745,000 gallons, an increase of 1,273,000 gallons. Whole milk sales declined to 6,783,000 gallons from the previous year's total of 7,036,000 gallons. The whole milk sales and manufacturing milk position of the Dairy Marketing Board over the past four years has been as follows:

Year ending 30th September	*Intake*	*Whole Milk Sales*	*Surplus to Whole Milk Requirements*	*Surplus as % of intake*
	'000 gal.	'000 gal.	'000 gal.	%
1960–61	14,307	7,162	7,145	49.9
1961–62	15,236	7,154	8,082	53.0
1962–63	15,472	7,036	8,436	54.5
1963–64	16,745	6,783	9,962	59.5

Until the 1st July, 1964, producer prices for milk delivered to the Board were calculated on the basis of guaranteed seasonal prices for all milk sold as whole milk, plus an amount of 750,000 gallons per annum. The balance of the intake was paid for at its net realization value for manufacturing purposes.

As a result of the recommendations of a Working Party set up to investigate the pricing and marketing arrangements for milk for the twelve months from the 1st July, 1964, it was agreed that the terms of the Milk Prices Agreement would be extended until the 30th June, 1965. However, in order to place the Dairy Marketing Board in a position whereby the subsidy commitment by Government could be reduced without raising the selling price of whole milk or materially affecting the producer's payout, a new basis for the calculation of the net realization value for surplus milk was agreed upon. Under this new system producers would be guaranteed a price for surplus milk at a level equivalent to that paid during 1963–64 in Southern Rhodesia plus 0.4d. per gallon or 21d. per gallon, whichever was the greater. After payment of this price the Board would be entitled to retain profits accruing from increases in the wholesale prices of dairy products. In addition the Board was granted the sole importing right for skimmed milk powder in bulk and at the same time withdrew from the repackaging trade in this product.

With rising production and a fall in whole milk sales resulting in greater quantities of milk going into manufacture, producer prices continued their downward trend. This position is one which is giving considerable cause for concern and the solution is beset with difficulties. Discussions are continuing as to the pricing and marketing arrangements to be effective from the 1st July, 1965, and it is hoped that a broad measure of agreement will be obtained on future arrangements.

Notice of termination of the Dairy Bonus Scheme was given with effect from the 1st December, 1963. This scheme, which has been in operation since 1954, will be run down and terminate on the 30th November, 1967.

Production of manufactured dairy products by the Dairy Marketing Board and private enterprise continued to increase, although local demand, especially in respect of butter and cheese, showed a decline. It was fortunate that markets for the increased production of these commodities were found in adjoining territories. However, if production continues to rise without an appreciable rise in local consumption disposal could become a serious problem. With limited manufacturing capacity and a continued demand considerable quantities of skim milk powder were imported.

Sheep

As local production now satisfies about half the current level of demand, scope remains for a considerable increase in sheep production. To foster local production the Cold Storage Commission continued to offer a market at fixed prices according to grade and weight. Slaughterings by the Commission during 1963 amounted to some 22,000 out of a national total of 62,900, and during the first nine months of 1964 a total of some 28,000 head. As a further incentive, imports of mutton and lamb are restricted and for the 12 months to the 31st March, 1965, a quota of 888 short tons has been allocated.

Poultry

Generally the local market continued to be self-sufficient in poultry and poultry products and limited exports took place. Export opportunities, especially for day-old chicks exist, but the markets are competitive.

The report of the Committee of Inquiry into the Poultry Industry was presented to Government and consideration is being given to the recommendations made.

CONCLUSION

While considerable progress has been made to put the new Ministry on a sound footing, much remains to be done before it will be able to contribute to maximum advantage in the vital requirements of the agricultural industry. The provisional organization and grading structure put into effect when the merger of agricultural services took place is still under inspection, and it is essential that the matter reaches finality without undue delay so as to leave the Ministry free to tackle the onerous tasks that lie ahead.

Not the least of these is the major problem of uplifting the subsistence sector of the agricultural economy to a level where it can make a real contribution to the sustained well-being of the country. This is a formidable task and it would be completely unrealistic to assume that it can be done without the provision of essential increases in staff, finance and facilities. It has been proved that the potential is there; required now as a matter of the utmost urgency are the further resources needed to develop the potential beneficially and to bring about stability. Unless these are provided the gap between the problem and its solution will continue to widen.

In conclusion I wish to place on record my most sincere appreciation of the very fine services rendered to agriculture by so many organizations and individuals during a period when the industry was beset with tremendous difficulties. It is difficult to remember when we

went through more trying and difficult times and it says much for our farmers and those who are in support of them that the Ministry and the industry have come through it all as well as they have.

My thanks are especially due to the producer organizations who remained a stimulus throughout, to the chairmen, members and management of the statutory boards, to the chairmen and members of the Agricultural Production Committee, Drought Relief Committee, the Freedom From Hunger Campaign Committee and the numerous other important and valuable committees which all contributed so much to the development of the industry.

Finally, I must thank very sincerely all members of the staff of the Ministry for a job well done under extremely difficult conditions.

C. A. MURRAY,
Secretary for Agriculture.

Economics and Markets Branch Report

for the period 1st January, 1964 to 30th September, 1964

With the passing of the Federation, the year under review has seen great changes in the responsibilities of this branch. Formerly, responsibility for the economic aspects of farming in the African areas was precluded from its purview, but since the 1st January, 1964, the work of this branch has covered the entire country. This of course is a logical and sound arrangement, and there will be many who regret that the split as between African and European agriculture, introduced for what originally were considered good reasons, should have lasted as long as it did.

In keeping with this extended responsibility the branch was increased by the transfer to it of the agricultural economist with the former Southern Rhodesia Ministry of Agriculture, and the economist post in the Ministry of Internal Affairs. During the year three more agricultural economists were appointed, bringing the branch up to full strength for the first time in several years. One of the new recruits is an African graduate from the University College of Rhodesia and Nyasaland. He is the first graduate from this university to join the Ministry on a permanent basis.

The dissolution of the Federation threw a very considerable amount of work on to the branch, mainly because of the need to review every detail of agricultural policy in the changed economic circumstances. Agriculture is proportionately of greater significance in the economy of Rhodesia than it was in that of the Federation, and this has led to a concentration of effort on the agricultural industry, and greater publicity on every action. With tighter price margins, everyone inside and outside the industry is more keenly aware of the need for a sound economic basis for all aspects of policy.

The branch has of course been closely concerned in all the work concerning price and marketing policies. It has taken part in the discussions and negotiations regarding new policies, prices and marketing arrangements for maize, beef and milk, for all of which the price agreements formerly in force between the Rhodesia National Farmers' Union and the Federal Government had fallen away. It has also been closely concerned in the discussions regarding the marketing of cotton, groundnuts and other crops and livestock products.

The Chief Agricultural Economist continued to attend the Agricultural Marketing Council as the Government's observer. The branch was also responsible for the preparation of the Ministry's evidence to the council. In addition, the Chief Agricultural Economist and members of the branch served on the following committees: the Cotton Marketing Committee; the Irrigation Co-ordinating Committee; the Sabi–Limpopo Authority; the Agricultural Production Committee; the Trade and External Relations Committee; the National Economic Advisory Council; the Rail Traffic Estimates Committee; the Beira Port Traffic Advisory Committee; the Committee of Inquiry into the Poultry Industry; the Farm Management Committee of the Rhodesia National Farmers' Union; the Industrial Tariff Committee when agricultural matters were discussed; and numerous departmental committees covering various aspects of matters such as the marketing of beans, farm credit, fibre production, citrus marketing, land settlement schemes and long-term capital requirements for development planning purposes.

Two prominent economic features of the year have been the introduction of a new system of credit to African farmers, and the great interest shown in various irrigation settlement schemes. The branch supplied three members (including the secretariat) to a committee which reported on the need for such credit.

The second feature mentioned—irrigation settlement schemes—has also figured largely in the work of the branch this year. The branch has co-operated in many investigations into the economics of about a dozen projects, ranging from small supplementary schemes of some 100 acres or so to the many thousands of acres involved in the Sabi–Lundi complex. Work on these schemes is still in its early stages, but there can be no doubt that over the next

generation there will be continued substantial increases in the area under irrigation, and that this will permit both an increase in the number of farmers and a more than proportionate increase in output. The heavy dependence on sugar in the large-scale lowveld irrigation schemes must, however, remain a source of concern unless and until such time as Rhodesia is able to obtain quotas on the international market for a high proportion of its exports.

The possibilities of increased settlement on dry-land areas has not, however, been neglected, and during the year the branch reported on opportunities for such schemes, particularly in regard to coffee plantations. The branch also took part in an inquiry, in October, 1964, into the possibility for increased export of fruit, flowers and vegetables by air to Europe.

Agricultural products account for very roughly half of Rhodesia's total exports. It is generally agreed that there are excellent opportunities to increase our agricultural exports over a wide range of crop and livestock products—this involves not only production and normal marketing problems, but also "international" problems such as preferences, surplus disposal programmes, international trade agreements, barter deals, the "Kennedy Round" of the General Agreement on Tariffs and Trade, and so on. In this connexion the branch has been closely involved in the work of the Trade and External Relations Committee. Members of the branch also attended the Food and Agricultural Organization Group on Grains and the Committee on Commodity Problems as observers, and provided a member on the delegation to the Food and Agricultural Organisation Africa Regional Conference held in Addis Ababa. Work on the many facets of international trade in agricultural products in fact accounts for a significant and increasing proportion of the branch's time and effort.

One of the senior members of the branch attended the twelfth International Conference of Agricultural Economists, held in Lyons, France.

Members of the branch lectured at the Gwebi and Chibero agricultural colleges, at an economics seminar held at the university, and at various courses in farm management organized by the Department of Conservation and Extension. Liaison between the branch and the farm management section of the Rhodesia National Farmers' Union continued. The branch continued to publish its *Monthly Economics and Markets Report,* which now runs to 450 copies a month and is sent to over a dozen different countries. The branch also continued to prepare bi-weekly brief summaries of fruit and vegetable market prices for the radio.

Surveys completed and published during the year include the following:

"The Cost of Production of Flue-cured Virginia Tobacco, 1962–63", undertaken on behalf of the Rhodesia Tobacco Association in both Zambia and Rhodesia, and published by that association.

"Beef Cattle Production Costs, 1959–62".

"Maize Production Costs, 1962–63".

"The Cost of Maize Production on Tobacco Farms, 1962–63".

"The Cost and Returns in Beef Cattle Production on Tobacco Farms, 1962–63".

"An Economic Appraisal of Coffee Production in Southern Rhodesia under Estate Conditions" (in collaboration with the Department of Research and Specialist Services).

"An Economic Policy Appraisal for the Future Production of Sorghums in Southern Rhodesia".

A preliminary farm management survey of specialized tobacco farms was completed for departmental use only.

The branch gratefully acknowledges its debt to the many farmers who have co-operated freely in its survey work.

Members of the staff published three articles in local journals:

"Let's make Capital out of Farming," *Rhod. Agric. Jnl.*, Nov.-Dec., 1963.

"Some Provisional Standards of Labour and Tractor Use in Crop Production," *Rhod. Agric. Jnl.*, May-June, 1964.

"Keeping Proper Records Pays Dividends," *Rhod. Tobacco Jnl.*, June, 1964.

Three economists continued on secondment to the Department of Conservation and Extension to assist in developing economic aspects of advisory work.

L. URIBE,
Chief Agricultural Economist.

Co-operatives and Loans Branch Report
for the year 1964

INTRODUCTION

After much deliberation Government decided that the Department of Marketing and Co-operatives in the Ministry of Internal Affairs should cease to exist with effect from 1st July, 1964, and that from that date there should be formed in the Ministry of Agriculture a branch to be known as the Co-operatives and Loans Branch.

All members of the staff of the Co-operatives Section of the old department were transferred to form this new branch in the Ministry of Agriculture. Those members of the staff who were employed by the African Development Fund became Government servants with effect from 1st July, 1964. Some members of the marketing section of the old department "came across" to the Ministry of Agriculture, others remained in the Ministry of Internal Affairs, and yet others were transferred to duties in another ministry.

The Co-operatives and Loans Branch (see Appendix F for the staff position to date) has taken over the following responsibilities:

Co-operatives Section

The responsibility for all co-operative societies registered under the Co-operative Societies Act [*Chapter 225*].

The responsibility for all co-operative companies registered under the Co-operative Companies Act [*Chapter 181*].

Marketing Section

The control and organization of the marketing of African non-co-operative member produce (except organized African cattle sales which still remain in the Ministry of Internal Affairs).

Loans Section

The control and organization of the new Agricultural Loan Fund, which deals with loans to African farmers.

This report will now deal with the year's activities in the co-operative field, and with work of the Marketing Section in its dealings over the year with activities that no longer remain with the Ministry of Internal Affairs, and finally with the activities of the Loan Section since its formation in July, 1964.

PROGRESS

General Information

The season was a very poor one from the crop point of view, so although Africans have supported their societies very well during the year there were many instances where members could not raise a single sack of produce to market. Those who did, however, obeyed the often-repeated lesson to concentrate on quality, with a result that 87.17 per cent. of the produce marketed through African societies was of A grade.

Societies showed a steady increase in membership, and the popularity and confidence shown in rural societies in the past has been more than maintained.

One new regional co-operative office was opened in Rusape with immediate success and plans are now completed to open another in Bulawayo in January, 1965, for which the staff are now being obtained and trained. The Umvuma office, by reason of large unexpected co-operative development in The Range and Buhera districts, was found to be unsuitably sited, and was moved to Enkeldoorn in the latter part of this year. This move reduced costs in mileage, removed the necessity of renting private offices, and made administration and development of societies easier.

Forty-eight societies (43 of them African) were formed and registered during the year, and it is interesting to note that since all agriculture, upon the folding up of the Federation, has become the territorial function of Rhodesia, European farmers have taken a great

interest in societies able to be formed and registered under *Chapter 225*. This Act was hitherto barred to them because European agriculture was a Federal subject, which Government administered co-operative companies (now under this branch per *Chapter 181*). European farmers have now formed and registered this year five agricultural and marketing societies under *Chapter 225*, and a glance at the statistics on page 34 of this report shows their sound progress in this venture.

No societies have been dissolved this year—in fact the history of those registered under *Chapter 225* indicates that only two societies have to date been dissolved since 1956—one European and one African consumer society, both started against the advice of the Registrar. No agricultural societies have failed since their formation under *Chapter 225*.

The expansion in African farmer membership of societies this year has amounted to 2,657. The membership of European societies to date is 189.

The following is the category of societies registered under *Chapter 225* in existence as at 31st December, 1964:

African marketing and agricultural supply societies . . .	110
Indian thrift and loan societies	2
African marketeers' society	1
African housing society	1
African wholesale society	1
European marketing and agricultural supply societies . . .	5
	120

Co-op. grain on its way to the Grain Marketing Board.

Marketing

Of the 110 African marketing societies, only 81 marketed any produce—of the 29 which did not market 12 were formed too late in the year to do so, and the remaining 17 because their members just had no produce to dispose of. The African Pig Society is engaged

in building its pens and producing its weaners for members to take over, so marketing is not expected to commence there until mid-1965.

The 81 African societies marketed as follows:

	Grade	*Bags*
Maize	A	43,507
	B	3,174
	C	889
Groundnuts	S	4
	A	6,000
	B	1,964
Grain sorghums	S	790
	A	515
	B	541
Munga	A.B	118
Sunnhemp		197
Rapoko		121
Sunflower		89
Velvet beans		193
Sugar beans		303
Beans		9
Soya beans		9
Wheat		168
Cow peas		4
Maize seed		11
Groundnut seed		3
Ration beans		4
Green peas (44,226 lb. @ 200 per bag)		222
Seed beans (662,289 lb. @ 110 per bag)		6,021
	a total of	64,856 bags,

also 1,178,393 lb. cotton (3,112 wool packs), 24,483 lb. of lettuce seed and 951 lb. of tomato seed.

The above represented the produce of 7,645 members and gave a crop turnover of £179,048— an increase of £12,607 over the figures for 1963, although due to drought there were 136 sacks of produce less than last year actually marketed. The increase in crop turnover is mainly accounted for by the marketing of 535,356 lb. more of cotton. African societies issued 66,500 sacks to their members at a total value of £8,035 and hired transport for marketing members' produce costing £12,892.

Produce marketed by African societies this year was graded as follows:

Grade S — 794 sacks. Grade B — 5,679 sacks.
Grade A — 50,022 sacks. Grade C — 889 sacks.

The breakdown of these figures indicate that 16 societies marketed Grade S grain sorghums, and two societies Grade S groundnuts. Sixty-five societies marketed Grade A maize, grain sorghum and groundnuts. Considering the poor crop harvest these figures reflect a very earnest effort by societies to market high-quality produce.

The following figures show the quality of produce in percentages of grades marketed by African societies since 1959:

Grade	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*
S	—	—	—	0.20%	2.15%	1.38%
A	67.00%	91.52%	72.99%	67.00%	71.50%	87.17%
B	32.60%	8.01%	21.11%	26.76%	24.92%	9.90%
C	.40%	.47%	5.89%	6.04%	1.43%	1.55%
D	—	—	.01%	—	—	—

This reveals a very high standard of marketing over a six-year period, and is largely due to the grading courses held for staff and co-operative personnel by the Grain Marketing Board.

The action of the Grain Marketing Board in this, and other aspects, in helping co-operative societies is very sincerely appreciated.

African societies also marketed for the first time this year direct to the Cold Storage Commission from the veld 112 head of members' cattle, which realized £2,283 in the following grades:

A	3 beasts
GAQ	44 beasts
FAQ	34½ beasts
Compound	25½ beasts
Inferior	11 beasts
Rejects	3 beasts
Condemned	1 beast

N.B.—One beast killed out with half of the carcass of an FAQ grade and the other half of a Compound grade.

Supplies

The supply side of African co-operative societies has been greatly "stepped up" within the last 12 months.

Through short-term loans from various sources the following has been purchased this year by African societies for their members:

Fertilizer	£48,168	(In 1963 £7,463)
Seed	£10,790	(In 1963 £4,735)
Total	£58,958	(In 1963 £12,198)

This shows an increase spent on seed and fertilizer of £46,760.

Through medium-term loans the following has been purchased by societies for their members:

Agricultural equipment	£41,569	(In 1963 £18,822)

This shows an increase of £22,747 spent on this commodity.

African societies also purchased through their own cash for members items such as twine, spare parts for implements, etc., amounting to £4,774. Small services such as these, which save a member travelling long distances to the nearest store or town for bolts, plough shares, twine, etc., are greatly appreciated by the farmers.

DETAILS OF CO-OPERATIVE SOCIETIES REGISTERED UNDER *CHAPTER 225*

Statistical details of African marketing and agricultural supply societies for the year 1964 are as follows (of these African marketing and agricultural supply co-operative societies: 42 are in the Purchase Areas, 56 are in the Tribal Trust Land, 11 are in the irrigation projects, one is in the unreserved land, totalling 110):

Registered No.	*Name*	*Membership*	*Share Capital*	*Produce Marketed*			*Cash Handlings*
Bulawayo Region							
27	Gwatemba Producers' Co-operative Society Ltd.	87	£174	Maize	A	287 bags	£1,973
					B	12 bags	
	1964 dividend on shares: 2½% to be paid.				C	3 bags	
				Groundnuts	S	3 bags	
					A	28 bags	
				Grain sorghum	S	2 bags	
					A	4 bags	
				Munga	AB	5 bags	
						344 bags	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handlings
38	Godhlwayo Producers' Co-operative Society Ltd. .	44	£88	Cattle			£881
				GAQ		8 head	
	1964 dividend on shares: nil.			FAQ		10 head	
				Compound		2 head	
				Inferior		1 head	
				Reject		2 head	
						23 head	
40	Gwaai Producers' Co-operative Society Ltd. . .	106	£212	Maize	A	30 bags	£3,099
					B	5 bags	
	1964 dividend on shares: 2½% to be paid.				C	4 bags	
				Groundnuts	A	4 bags	
				Grain sorghum	A	9 bags	
				Velvet beans		148 bags	
				Sunnhemp		157 bags	
				Sunflower		37 bags	
				Cow peas		2 bags	
						396 bags	
				Cattle			
				GAQ		4 head	
				FAQ		11½ head	
				Compound		9½ head	
				Inferior		2 head	
				Reject		1 head	
						28 head	
64	Zinyama Producers' Co-operative Society Ltd. .	23	£46	Maize	B	10 bags	£295
				Grain sorghum	S	6 bags	
	1964 dividend on shares: nil.			Velvet beans		11 bags	
						27 bags	
				Cattle			
				FAQ		3 head	
				Compound		5 head	
				Inferior		6 head	
						14 head	
65	Gwavamtangwi Producers' Co-operative Society Ltd.	95	£95	Maize	A	54 bags	£2,561
					C	1 bag	
				Groundnuts	A	72 bags	
	1964 dividend on shares: 2½% to be paid.			Grain sorghum	S	68 bags	
					A	23 bags	
				Munga	AB	7 bags	
						225 bags	
66	Ngungumbane Producers' Co-operative Society Ltd.	71	£71	Maize	A	103 bags	£2,711
					B	6 bags	
	1964 dividend on shares: 2½% to be paid.			Groundnuts	A	147 bags	
				Grain sorghum	S	142 bags	
					A	47 bags	
					B	3 bags	
				Munga	AB	13 bags	
				Rapoko		81 bags	
						542 bags	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handlings
70	Nyamondo Producers' Co-operative Society Ltd.	88	£88	Maize	A	60 bags	£4,101
					B	7 bags	
	1964 dividend on shares: 2½% to be paid.			Groundnuts	B	269 bags	
				Grain sorghum	S	241 bags	
					A	50 bags	
					B	1 bag	
				Munga	AB	17 bags	
						645 bags	
71	Tjolotjo Producers' Co-operative Society Ltd.	112	£112		nil		£1,740
	1964 dividend on shares: nil.						
77	Samnene Producers' Co-operative Society Ltd.	19	£38		nil		£779
	1964 dividend on shares: nil.						
95	Negobe Producers' Co-operative Society Ltd.	64	£64	Maize	A	116 bags	£2,457
					B	23 bags	
	1964 dividend on shares: 2½% to be paid.			Groundnuts	A	77 bags	
					B	20 bags	
				Grain sorghum	S	42 bags	
					A	12 bags	
				Munga	AB	11 bags	
				Rapoko		19 bags	
						320 bags	
96	Sipepa Producers' Co-operative Society Ltd.	56	£56		nil		£1,393
	1964 dividend on shares: nil.						
97	Dhlamini Producers' Co-operative Society Ltd.	36	£36		nil		£352
	1964 dividend on shares: nil.						
99	Nkosikazi Producers' Co-operative Society Ltd.	21	£42	Maize	A	91 bags	£1,090
					B	50 bags	
	1964 dividend on shares: 2½% to be paid.				C	14 bags	
				Groundnuts	A	1 bag	
				Grain sorghum	A	6 bags	
				Sunnhemp		5 bags	
				Velvet beans		14 bags	
						181 bags	
101	Zinapi Producers' Co-operative Society Ltd.	21	£21	Maize	A	7 bags	£504
					B	26 bags	
	1964 dividend on shares: nil.			Groundnuts	A	1 bag	
				Grain sorghum	B	2 bags	
				Rapoko		4 bags	
				Sunnhemp		5 bags	
				Velvet beans		5 bags	
						50 bags	
102	Mzola Producers' Co-operative Society Ltd.	24	£24	Maize	A	12 bags	£561
					B	56 bags	
	1964 dividend on shares: nil.				C	1 bag	
				Groundnuts	S	1 bag	
				Grain sorghum	A	24 bags	
					B	1 bag	
				Rapoko		13 bags	
				Cow peas		2 bags	
						110 bags	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handlings
120	Tjolotjo Pig Producers' Co-operative Society Ltd. . 1964 dividend on shares: nil.	12	£24	nil			£27
		879	£1,191			2,840 bags	£24,524
				+ 65 head of cattle.			
Enkeldoorn Region							
72	Mtoro Producers' Co-operative Society Ltd. . . 1964 dividend on shares: nil.	30	£60	Maize	A	110 bags	£719
75	Lancashire Producers' Co-operative Society Ltd. . 1964 dividend on shares: nil.	38	£76	nil.			£287
76	Chilimanzi North Producers' Co-operative Society Ltd. 1964 dividend on shares: nil.	54	£54	nil.			£580
78	Wiltshire Producers' Co-operative Society Ltd. . 1964 dividend on shares: nil.	25	£50	Maize	A	49 bags	£615
91	Chilimanzi South Producers' Co-operative Society Ltd. 1964 dividend on shares: nil.	28	£28	nil			£220
92	Maware Producers' Co-operative Society Ltd. . . 1964 dividend on shares: nil.	51	£51	nil			£735
105	Mpatsi Producers' Co-operative Society Ltd. . . 1964 dividend on shares: nil.	35	£35	nil			£442
106	Mboe Producers' Co-operative Society Ltd. . . 1964 dividend on shares: nil.	16	£32	nil			£236
113	Gamanya Producers' Co-operative Society Ltd. . 1964 dividend on shares: nil.	28	£56	nil			£241
114	Murimbinda Producers' Co-operative Society Ltd. 1964 dividend on shares: nil.	22	£44	Wheat		153 bags	£491
117	Gandame Producers' Co-operative Society Ltd. . 1964 dividend on shares: nil.	40	£80	nil			£908
118	Mweri Hari Sachapiri Producers' Co-operative Society Ltd. 1964 dividend on shares: nil.	18	£36	Wheat		15 bags	£222
119	Nharira Producers' Co-operative Society Ltd. . . 1964 dividend on shares: nil.	35	£35	nil			£42
		420	£637			327 bags	£5,738
Fort Victoria Region							
8	Mshawasha East Producers' Co-operative Society Ltd.	241	£482	Maize	A	881 bags	£10,228
				Groundnuts	A	1,022 bags	
					B	365 bags	
	1964 dividend on shares: 5% to be paid.			Grain sorghum	A	77 bags	
					B	240 bags	
				Munga	AB	22 bags	
						2,607 bags	
				Cotton Class I		7,283 lb.	
9	Mshagashe Producers' Co-operative Society Ltd. .	103	£206	Groundnuts	A	58 bags	£842
				Grain sorghum	S	2 bags	
	1964 dividend on shares: nil.					60 bags	
11	Mshawasha West Producers' Co-operative Society Ltd.	95	£190	Maize	A	437 bags	£3,111
				Groundnuts	A	373 bags	
				Grain sorghum	S	126 bags	
	1964 dividend on shares: nil.				A	39 bags	
				Munga	AB	2 bags	
						977 bags	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handlings
19	Zinyaningwe Producers' Co-operative Society Ltd.	95	£190	Maize	A	64 bags	£1,009
				Groundnuts	A	36 bags	
	1964 dividend on shares: nil.			Grain sorghum	B	109 bags	
				Munga	AB	5 bags	
						214 bags	
23	Ndanga Producers' Co-operative Society Ltd.	179	£179		nil		£824
	1964 dividend on shares: nil.						
25	Dewure Producers' Co-operative Society Ltd.	195	£390	Maize	A	8 bags	£2,050
				Groundnuts	A	118 bags	
	1964 dividend on shares: nil.			Grain sorghum	A	7 bags	
				Munga	AB	5 bags	
						138 bags	
				Cotton	Class I	3,571 lb.	
					II	223 lb.	
						3,794 lb.	
29	Mungezi Producers' Co-operative Society Ltd.	23	£70	Maize	A	92 bags	£1,584
				Groundnuts	A	18 bags	
	1964 dividend on shares: 5% to be paid.			Grain sorghum	S	18 bags	
						128 bags	
				Cotton	Class I	3,238 lb.	
					II	1,956 lb.	
						5,194 lb.	
31	Chibi South Producers' Co-operative Society Ltd.	186	£186	Maize	A	43 bags	£1,892
				Groundnuts	A	377 bags	
	1964 dividend on shares: nil.			Grain sorghum	B	8 bags	
						428 bags	
35	Chibi North Producers' Co-operative Society Ltd.	87	£87	Groundnuts	B	78 bags	£1,339
	1964 dividend on shares: 5% to be paid.						
36	Jenya Producers' Co-operative Society Ltd.	33	£102	Groundnuts	B	108 bags	£420
	1964 dividend on shares: nil.						
37	Gamwa Producers' Co-operative Society Ltd.	59	£118	Maize	A	119 bags	£1,266
					B	2 bags	
	1964 dividend on shares: nil.			Groundnuts	A	38 bags	
					B	52 bags	
				Grain sorghum	S	3 bags	
					B	96 bags	
				Munga	AB	6 bags	
						316 bags	
43	Nyahunda Producers' Co-operative Society Ltd.	66	£132	Groundnuts	A	60 bags	£916
	1964 dividend on shares: nil.						
55	Mazare Producers' Co-operative Society Ltd.	10	£40		nil		£453
	1964 dividend on shares: nil.						
63	Nyarutedze Producers' Co-operative Society Ltd.	55	£55	Maize	A	6 bags	£1,545
				Groundnuts	A	159 bags	
	1964 dividend on shares: 5% to be paid.				B	160 bags	
						325 bags	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handlings
73	Chikuku Producers' Co-operative Society Ltd.	111	£111	Groundnuts	A	197 bags	£1,668
				Grain sorghum	S	2 bags	
	1964 dividend on shares: 5% to be paid.					199 bags	
74	Chishabe Producers' Co-operative Society Ltd.	59	£59	Maize	A	46 bags	£1,088
				Groundnuts	A	188 bags	
	1964 dividend on shares: 5% to be paid'				B	5 bags	
				Grain sorghum	A	25 bags	
						264 bags	
82	Matibi One Producers' Co-operative Society Ltd.	68	£68	Maize	A	106 bags	£3,106
				Groundnuts	A	449 bags	
	1964 dividend on shares: 5% to be paid.				B	149 bags	
						704 bags	
93	Kumboidza Producers' Co-operative Society Ltd.	58	£58	Groundnuts	A	78 bags	£879
	1964 dividend on shares: nil.						
112	Fube Panganai Producers' Co-operative Society Ltd.	56	£56	nil			£718
	1964 dividend on shares: nil.						
		1,779	£2,779			6,684 bags	£34,938
				+ 16,271 lb. cotton.			
Gwelo Region							
18	Silobela Producers' Co-operative Society Ltd.	60	£120	Maize	A	22 bags	£1,895
				Groundnuts	A	5 bags	
	1964 dividend on shares: 5% to be paid.				B	11 bags	
				Grain sorghum	A	7 bags	
						45 bags	
32	Jombe Producers' Co-operative Society Ltd.	81	£162	Maize	A	1,346 bags	£6,887
					B	745 bags	
	1964 dividend on shares: 5% to be paid.				C	241 bags	
				Groundnuts	A	11 bags	
					B	4 bags	
				Grain sorghum	B	2 bags	
						2,349 bags	
33	Josefa Producers' Co-operative Society Ltd.	85	£170	Maize	B	31 bags	£545
				Groundnuts	A	16 bags	
	1964 dividend on shares: 5% to be paid.			Munga	AB	1 bag	
						48 bags	
				Cotton	Class I	700 lb.	
39	Umniati Producers' Co-operative Society Ltd.	170	£340	Maize	A	497 bags	£7,036
					B	106 bags	
	1964 dividend on shares: 5% to be paid.				C	4 bags	
				Groundnuts	A	125 bags	
					B	135 bags	
				Grain sorghum	S	43 bags	
					A	68 bags	
					B	22 bags	
				Munga	AB	14 bags	
						1,014 bags	
				Cotton	Class I	14,350 lb.	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handlings
44	Jobolinko Producers' Co-operative Society Ltd.	28	£56	Nil			£64
	1964 dividend on shares: nil.						
45	Selukwe Producers' Co-operative Society Ltd.	168	£168	Maize	A	14 bags	£999
				Groundnuts	A	89 bags	
	1964 dividend on shares: nil.				B	26 bags	
						129 bags	
46	Gokwe Producers' Co-operative Society Ltd.	106	£212	Maize	A	10 bags	£2,285
					B	58 bags	
	1964 dividend on shares: 5% to be paid.				C	22 bags	
				Groundnuts	A	160 bags	
					B	82 bags	
				Grain sorghum	S	22 bags	
					A	87 bags	
					B	9 bags	
				Sugar beans		3 bags	
						453 bags	
52	Lower Gwelo Producers' Co-operative Society Ltd.	61	£61	Maize	A	40 bags	£297
				Groundnuts	A	6 bags	
	1964 dividend on shares: 5% to be paid.					46 bags	
54	Lundi Producers' Co-operative Society Ltd.	59	£59	Maize	A	52 bags	£671
					B	1 bag	
	1964 dividend on shares: 5% to be paid.			Groundnuts	A	110 bags	
					B	17 bags	
				Grain sorghum	S	11 bags	
					A	8 bags	
					B	5 bags	
				Munga	AB	6 bags	
				Sunnhemp		12 bags	
				Beans		8 bags	
						230 bags	
62	Mazviwa Producers' Co-operative Society Ltd.	43	£43	Maize	A	2 bags	£532
					B	1 bag	
	1964 dividend on shares: 5% to be paid.				C	6 bags	
				Groundnuts	A	13 bags	
					B	37 bags	
				Grain sorghum	S	58 bags	
					B	5 bags	
				Munga	AB	2 bags	
						124 bags	
68	Samambgwa Producers' Co-operative Society Ltd.	26	£26	Maize	A	223 bags	£1,696
					B	220 bags	
	1964 dividend on shares: 5% to be paid.				C	73 bags	
				Groundnuts	B	4 bags	
				Grain sorghum	B	1 bag	
						521 bags	
80	Ntingwe Producers' Co-operative Society Ltd.	12	£12	Maize	A	170 bags	£515
					B	40 bags	
	1964 dividend on shares: nil.				C	13 bags	
				Groundnuts	B	7 bags	
						230 bags	

Regis-tered No.	Name	Member-ship	Share Capital	Produce Marketed			Cash Handlings
81	Nduku Producers' Co-operative Society Ltd. . .	34	£34	Maize	Seed	11 bags	£1,735
					B	407 bags	
	1964 dividend on shares: 5% to be paid.				C	411 bags	
				Groundnuts	B	38 bags	
				Grain sorghum	B	3 bags	
						870 bags	
88	Nhema Producers' Co-operative Society Ltd. . .	42	£42	Maize	A	13 bags	£272
				Groundnuts	A	15 bags	
	1964 dividend on shares: nil.			Beans		1 bag	
				Rapoko		4 bags	
						33 bags	
90	Nemangwe Producers' Co-operative Society Ltd. .	40	£40	Maize	A	2,156 bags	£6,585
					B	511 bags	
	1964 dividend on shares: 2½% to be paid.				C	17 bags	
				Groundnut seed		3 bags	
					A	38 bags	
				Grain sorghum	S	4 bags	
				Soya beans		7 bags	
						2,736 bags	
				Cotton	Class I	4,550 lb.	
104	Mhutshapansi Producers' Co-operative Society Ltd.	20	£20	Maize	A	32 bags	£261
	1964 dividend on shares: 5% to be paid.						
121	Copper Queen South Producers' Co-operative Society Ltd.	17	£34		nil		£1,688
	1964 dividend on shares: nil.						
		1,052	£1,599			8,860 bags	£33,963
				+ 19,600 lb. cotton.			
Rusape Region							
2	Dowa Producers' Co-operative Society Ltd. . .	134	£270	Maize	A	4,214 bags	£10,496
					B	61 bags	
	1964 dividend on shares: 2½% to be paid.				C	13 bags	
				Groundnuts	A	100 bags	
				Munga	AB	2 bags	
						4,390 bags	
16	Ziyambe Producers' Co-operative Society Ltd.	120	£240	Maize	A	368 bags	£3,951
				Groundnuts	A	484 bags	
	1964 dividend on shares: nil.					852 bags	
41	Ruzani Producers' Co-operative Society Ltd. . .	32	£32		nil		£67
	1964 dividend on shares: nil.						
49	Changadzo Producers' Co-operative Society Ltd. .	86	£86	Maize	A	29 bags	£1,723
				Groundnuts	A	49 bags	
	1964 dividend on shares: 2½% to be paid.			Grain sorghum	A	6 bags	
						84 bags	
50	Bannockburn Producers' Co-operative Society Ltd.	35	£70		nil		£561
	1964 dividend on shares: 5% to be paid.						
86	Mutiweshiri Producers' Co-operative Society Ltd. .	64	£128	Maize	A	138 bags	£3,001
				Groundnuts	A	537 bags	
	1964 dividend on shares: nil.					675 bags	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handling
110	Madetere Producers' Co-operative Society Ltd.	26	£52	Maize	A	72 bags	£629
				Groundnuts	A	11 bags	
	1964 dividend on shares: nil.					83 bags	
111	Inyanga East Producers' Co-operative Society Ltd.	75	£150		nil		£319
	1964 dividend on shares: nil.						
116	Nyamaropa Irrigation Producers' Co-operative Society Ltd.	221	£442	Seed beans		2,128 bags	£12,865
	1964 dividend on shares: nil.						
		793	£1,470			8,212 bags	£33,612
Salisbury North-east Region							
4	Chitowa Producers' Co-operative Society Ltd.	76	£152	Cotton Class	I	3,756 lb.	£2,009
					II	726 lb.	
	1964 dividend on shares: 5% to be paid.				III	315 lb.	
						4,797 lb.	
7	Budga Producers' Co-operative Society Ltd.	93	£186	Groundnuts	A	61 bags	£2,481
	1964 dividend on shares: 5% to be paid.						
17	Madziwa Producers' Co-operative Society Ltd.	283	£283	Maize	A	105 bags	£3,051
					C	5 bags	
	1964 dividend on shares: 5% to be paid.			Sunflower		19 bags	
				Velvet beans		15 bags	
						144 bags	
				Cotton Class I		952 lb.	
22	Chiweshe Producers' Co-operative Society Ltd.	383	£383	Maize	A	351 bags	£9,721
					B	121 bags	
	1964 dividend on shares: 5% to be paid.					472 bags	
26	Bushu Producers' Co-operative Society Ltd.	105	£105		nil		£1,227
	1964 dividend on shares: nil.						
28	Chesa Producers' Co-operative Society Ltd.	185	£370	Maize	A	6,455 bags	£17,972
					B	100 bags	
	1964 dividend on shares: 5% to be paid.			Groundnuts	A	58 bags	
					B	128 bags	
				Grain sorghum	B	8 bags	
						6,749 bags	
				Cattle			
				A		3 head	
				GAQ		32 head	
				FAQ		10 head	
				Compound		9 head	
				Inferior		2 head	
				Condemned		1 head	
						57 head	
48	Masembura Producers' Co-operative Society Ltd.	170	£170	Groundnuts	A	9 bags	£3,391
	1964 dividend on shares: 5% to be paid.			Cotton Class	I	6,426 lb.	
					III	38 lb.	
				Unclassified		59 lb.	
						6,523 lb.	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handlings
51	Chigogo Producers' Co-operative Society Ltd.	220	£220	Maize	A	1,139 bags	£7,582
					B	133 bags	
	1964 dividend on shares: 5% to be paid.				C	13 bags	
				Sunflower		17 bags	
						1,302 bags	
56	Kakeza Producers' Co-operative Society Ltd.	66	£66	nil			£714
	1964 dividend on shares: nil.						
67	Chironga Producers' Co-operative Society Ltd.	60	£60	Maize	B	32 bags	£1,629
					C	5 bags	
	1964 dividend on shares: nil.			Sunflower		5 bags	
						42 bags	
69	Msana Producers' Co-operative Society Ltd.	96	£96	nil			£2,787
	1964 dividend on shares: 5% to be paid.						
83	Makope Producers' Co-operative Society Ltd.	117	£117	Maize	A	126 bags	£3,267
					B	31 bags	
	1964 dividend on shares: 5% to be paid.				C	26 bags	
				Groundnuts	A	1 bag	
						184 bags	
				Cotton Class I		362 lb.	
84	Negomo Producers' Co-operative Society Ltd.	115	£115	Maize	A	310 bags	£3,222
	1964 dividend on shares: 5% to be paid.			Cotton Class I		223 lb.	
103	Mukombwe Producers' Co-operative Society Ltd.	76	£76	Maize	A	218 bags	£1,687
					B	45 bags	
	1964 dividend on shares: 5% to be paid.				C	17 bags	
				Sunflower		11 bags	
						291 bags	
		2,045	£2,399			9,564 bags	£60,740
				+ 12,857 lb. cotton.			
				57 head of cattle.			
Salisbury South-west Region							
1	Chitomborgwizi Producers' Co-operative Society Ltd.	175	£348	Maize	A	9,912 bags	£20,947
					B	2 bags	
	1964 dividend on shares: 7½% to be paid.			Groundnuts	A	22 bags	
					B	23 bags	
				Grain sorghum	A	4 bags	
				Sunnhemp		17 bags	
						9,980 bags	
3	Marirangwe Producers' Co-operative Society Ltd.	41	£82	Maize	A	2,108 bags	£5,222
					B	62 bags	
	1964 dividend on shares: 5% to be paid.					2,170 bags	
6	Msengezi Producers' Co-operative Society Ltd.	164	£328	Maize	A	5,393 bags	£16,203
					B	20 bags	
	1964 dividend on shares: 5% to be paid.			Groundnuts	A	254 bags	
					B	218 bags	
				Grain sorghum	B	19 bags	
						5,904 bags	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handlings
12	Chimbganda Producers' Co-operative Society Ltd.	74	£148	Maize	A	1,027 bags	£2,756
	1964 dividend on shares: 2½% to be paid.						
20	Muda Producers' Co-operative Society Ltd. . .	30	£60	Maize	A	112 bags	£1,213
	1964 dividend on shares: nil.						
47	Shangure Producers' Co-operative Society Ltd. .	31	£62	Maize	A	637 bags	£2,647
				Groundnuts	A	108 bags	
	1964 dividend on shares: 5% to be paid.					745 bags	
61	Gangarawe Producers' Co-operative Society Ltd. .	157	£157	Maize	A	1,713 bags	£7,446
					B	243 bags	
	1964 dividend on shares: 5% to be paid.			Groundnuts	A	98 bags	
					B	15 bags	
				Soya beans		2 bags	
				Sunnhemp		1 bag	
						2,072 bags	
79	Dendenyore Producers' Co-operative Society Ltd.	79	£79	Maize	A	144 bags	£1,044
					B	7 bags	
	1964 dividend on shares: nil.			Groundnuts	A	9 bags	
				Grain sorghum	A	1 bag	
						161 bags	
87	Mahusekwa Producers' Co-operative Society Ltd.	80	£80	Maize	A	4 bags	£1,340
				Groundnuts	A	2 bags	
	1964 dividend on shares: nil.					6 bags	
98	Vuti Producers' Co-operative Society Ltd. . . .	32	£96	Maize	A	1,435 bags	£4,405
				Groundnuts	A	19 bags	
	1964 dividend on shares: 2½% to be paid.				B	13 bags	
						1,467 bags	
115	Mudzimu Producers' Co-operative Society Ltd. .	66	£66		nil		£1,672
	1964 dividend on shares: nil.						
		929	£1,506			23,644 bags	£64,895
Umtali Region							
5	Tsonzo Producers' Co-operative Society Ltd. . .	89	£178	Green peas		24 bags	£714
	1964 dividend on shares: nil.						
10	Mukuni Producers' Co-operative Society Ltd. . .	122	£242	Groundnuts	A	193 bags	£1,449
				Grain sorghum	A	11 bags	
	1964 dividend on shares: nil.				B	7 bags	
						211 bags	
15	Nyanyadzi Producers' Co-operative Society Ltd. .	230	£460	Seed beans		1,335 bags	£17,297
				Ration beans		4 bags	
	1964 dividend on shares: 5% to be paid.					1,339 bags	
				Cotton Class	I	373,253 lb.	
					II	377 lb.	
					III	2,341 lb.	
						375,971 lb.	

Registered No.	Name	Membership	Share Capital	Produce Marketed			Cash Handlings
				Seed lettuce		1,440 lb.	
				Seed tomato		762 lb.	
						2,202 lb.	
24	Chibuwe Producers' Co-operative Society Ltd.	151	£302	Sugar beans		300 bags	£14,187
				Seed beans		1,085 bags	
	1964 dividend on shares: 5% to be paid.					1,385 bags	
				Cotton Class	I	115,595 lb.	
					II	174,102 lb.	
					III	31,335 lb.	
						321,032 lb.	
				Seed lettuce		2,227 lb.	
30	Chamutsa Producers' Co-operative Society Ltd.	91	£182	Cotton Class	I	137,985 lb.	£4,230
					II	2,103 lb.	
	1964 dividend on shares: 5% to be paid.				III	2,571 lb.	
						142,659 lb.	
34	Maranke North Producers' Co-operative Society Ltd.	80	£80	Maize	A	2 bags	£1,002
				Groundnuts	A	93 bags	
	1964 dividend on shares: nil.					95 bags	
42	Chakowa Producers' Co-operative Society Ltd.	62	£124	Seed beans		241 bags	£7,764
	1964 dividend on shares: 5% to be paid.			Cotton Class	I	144,168 lb.	
					II	732 lb.	
					III	365 lb.	
						145,265 lb.	
				Seed lettuce		7,797 lb.	
				Seed tomatoes		189 lb.	
						7,986 lb.	
60	Mutema Producers' Co-operative Society Ltd.	94	£188	Seed beans		1,232 bags	£9,380
	1964 dividend on shares: 5% to be paid.			Cotton Class	I	122,651 lb.	
					II	6,868 lb.	
						129,519 lb.	
				Seed lettuce		8,681 lb.	
94	Mutambara (Guhune) Producers' Co-operative Society Ltd.	68	£136	Peas		198 bags	£1,645
				Seed lettuce		4,338 lb.	
	1964 dividend on shares: 5% to be paid.			Cotton Class I		15,219 lb.	
107	Chayamiti Producers' Co-operative Society Ltd.	30	£30	nil			£353
	1964 dividend on shares: nil.						

Registered No.	Name	Membership	Share Capital	Produce Marketed	Cash Handlings
122	Maranke Irrigation Producers' Co-operative Society Ltd. 1964 dividend on shares: nil.	23	£46	nil	£52
		1,040	£1,968	4,725 bags	£58,073
				+ 24,483 lb. seed lettuce. 951 lb.seed tomato. 1,129,665 lb. cotton.	

SUMMARY OF STATISTICAL DETAILS OF AFRICAN MARKETING AND AGRICULTURAL SUPPLY SOCIETIES

Region	Number of Societies	Membership	Share Capital £	Number of bags of Produce Marketed	Cash Handlings £
Bulawayo	16	879	1,191	2,840	24,524
Enkeldoorn	13	420	637	327	5,738
Fort Victoria	19	1,779	2,779	6,684	34,938
Gwelo	17	1,052	1,599	8,860	33,963
Rusape	9	793	1,470	8,212	33,612
Salisbury N.E.	14	2,045	2,399	9,564	60,740
Salisbury S.W.	11	929	1,506	23,644	64,895
Umtali	11	1,040	1,968	4,725	58,073
	110	8,937	13,549	64,856	316,483

The above figures in comparison with those for 1963 show an increase of 2,657 farmer members, £3,363 in share capital, and an increase of £114,425 in cash handled.

The sacks marketed shows a decrease of 136.

STATISTICAL DETAILS OF EUROPEAN MARKETING AND AGRICULTURAL SUPPLY SOCIETIES

For the year 1964 are as follows:

Registered Number	Name	Membership	Share Capital £	Cash Handling £
85	The Gwelo Producers' Co-operative Society Limited	29	145	14,654
89	Headlands Producers' Co-operative Society Limited	96	192	94,082
100	Glendale Producers' Co-operative Society Limited	21	42	5,067
108	Shamva Producers' Co-operative Society Limited	29	58	6,500
109	Melsetter Producers' Co-operative Society Limited	14	28	73
		189	465	120,376

This means that in 1964 marketing and agricultural supply societies have a total cash handling of £436,859.

There is no record of the five European societies having engaged in any direct marketing of members' produce.

STATISTICAL DETAILS OF SOCIETIES REGISTERED FOR PURPOSES OTHER THAN AGRICULTURE

Registered Number	*Name*	*Member-ship*	*Share Capital* £	*Cash Handling* £	*Type of Society*
13	The Indian Thrift & Loan Co-operative Society Limited .	57	13,952	4,099	Thrift and loan
21	Nyanyadzi Produce Market Co-operative Society Limited .	40	320	49	Property owning
57	Mhlahlandlela Housing Co-operative Society Limited .	38	1,109	2,151	Property owning
58	Zimbabwe Economy Wholesale Co-operative Society Limited	19	506	NIL	Wholesale consumers
59	The Bulawayo Hindu Co-operative Society Limited .	59	21,149	7,433	Thrift and loan
		213	37,036	13,732	

DETAILS OF CO-OPERATIVE COMPANIES REGISTERED UNDER *CHAPTER 181*

These relate to agricultural co-operative companies, as registrations under this Act are restricted to that category only.

Registered Number	*Name*	*Membership*	*Share Capital* £	*Turnover* £
1	Farmers' Co-operative Ltd.	3,481	Ord. 116,038 Pref. 709,605	7,959,013
2	Matabeleland Farmers' Co-operative Ltd. . . .	1,258	177,749	1,296,252
8	Rhodesian Co-operative Citrus Growers' Association Ltd. .	50	265	257
11	The Turkish Tobacco Co-operative Co. of Rhodesia Ltd.	1,066	21,006	23,677
22	The Federated Central Co-operative Co. of Southern Rhodesia Ltd. . . .	15	234	1,174
23	The Victoria Farmers' Co-operative Co. Ltd. . .	310	50,035	567,518
24	Rhodesia National Pig Breeders' Co-operative Co. Ltd. .	1,157	133,743	128,084
26	The Gazaland Co-operative Cheese Factories Ltd. .	77	6,163	61,082
30	The Umtali Farmers' Co-operative Ltd. . . .	347	20,988	255,173
31	The Sinoia Tobacco Farmers' Co-operative Co. Ltd. .	57	13,424	35,857
34	Marandellas Farmers' Co-operative Ltd.	435	27,375	696,497
35	Pig Breeders' Co-operative Industries Ltd. . . .	8	500	25
36	Colcom Products Central Co-operatives Ltd. . . .	3	250,501	2,093,423
38	Beatrice Agricultural Co-operative Co. Ltd. . .	145	725	86,795

Registered Number	*Name*	*Membership*	*Share Capital* £	*Turnover* £
40	Bromley Agricultural Co-operative Co. Ltd. . .	34	185	14,778
41	The Hartley Farmers' Agricultural Co-operative Co. Ltd.	151	825	120,000 (Est
42	Centenary Agricultural Co-operative Co. Ltd. . .	70	350	64,664
43	Chakari Farmers' Agricultural Co-operative Co. Ltd. .	23	115	26,700
44	Tengwe Agricultural Co-operative Co. Ltd. . .	36	180	8,714
45	Rhodesian Poultry Co-operative Co. Ltd. (registered 1964).			
46	Rhodesian Coffee Growers' Co-operative Co. Ltd. (registered 1964).			
		8,723	1,530,006	13,439,683

LOANS

These now form a special section of the branch and in July, 1964, an Agricultural Loan Fund was created in terms of the Audit and Exchequer Act. This fund, which administers short-, medium- and long-term loans for African farmers, both for those who are members and for those who are not members of co-operatives, has taken over the assets and liabilities of the old African Development Fund Loans Scheme, and has obtained other funds

A Co-op. committee before society can afford an office.

through the Treasury from a commercial source. The results of the application of these loans in the field to date are extremely good, particularly in regard to fertilizer and seed implementation.

The new fund has a central committee for policy matters with the Officer in Charge of the Co-operatives and Loans Branch as its chairman, with members from the Ministry of Internal Affairs, Treasury and the Department of Conservation and Extension, an agricultural economist and the Finance Officer of this Ministry serving on the committee. There is also a sub-committee with the Finance Officer as chairman for vetting and passing loans in terms of the policy set down by the central committee.

Loans for members of co-operative societies are implemented through the committees of these societies, either on the communal responsibility basis, or with the society acting as an agent of the fund.

For non-co-operative members 160 district loans committees have been created with group officers as chairmen, agricultural officers and African extension officers as members, plus tribal authorities, e.g. headmen, kraal heads, etc., and local Africans of important standing in the district.

The latest schedule of this fund forms Appendix E of this report. The item "District Commissioners" represents a carry-over of loans promised by these officials to farmers when the Ministry of Internal Affairs was still handling loans to Africans.

As far as African co-operative societies are concerned appendices A and B to this report indicate the loan repayments position to date. Considering the poor crops during the past two seasons, short-term loan repayments of both current and arrear loans are very satisfactory.

The position of medium-term loans is not so good as far as repayment is concerned, and societies have been told that, if the season's harvest is as good as it is expected to be at the time of writing this report, the arrears must be paid off by members or civil action will have to be instituted against evaders as distinct from those with poor crops through adverse weather conditions.

Co-op. members grade their crop on the cob before marketing.

STAFF AND ESTABLISHMENT

Co-operatives Section

The staff for the Co-operative Section is recorded in Appendix F, together with those of the other two sections of the branch. The European regional staff has been found to be quite inadequate to cope with the vast expansion of the branch in the last six months. Repeated requests to relieve the position of these men working on a regular average of 40 per cent. overtime per month has at last brought the hope of relief with the possibility of being able to employ women clerks. This must be done immediately to avoid the probability of a breakdown in some regions during 1965 marketing, through sheer overwork.

Heavy responsibilities and extra duties have been taken on by the branch since July, 1964, and the whole staff position is under review.

Marketing Section

The Marketing Liaison Officer has to use the regional co-operative officers for his district work, and has thus increased their work, but the intention is to move as much non-member marketing over to member marketing as is possible, and considerable success has been achieved in this field. This officer's head office duties are chiefly working on committees of statutory boards and liaising in the Ministry upon all marketing matters with the various departments therein, and also with the Ministry of Internal Affairs on purely African marketing problems.

Loans Section

The administrative staff is just able to cope with the position as it is at present, but the accounting staff (clerical) will have to be increased to handle the enormous increase in African loans, which can be seen by glancing at the figures in Appendix E of this report, more especially as the fund could well be increased by as much as £150,000 from a private source for loans to co-operatives in mid-1965.

An Assistant Co-op. Officer teaching methods of weighing, grading and sewing sacks of grain for market.

All staff have performed their duties most loyally and most efficiently once again, and it is no exaggeration to say that only devotion to the task they were performing prevented some officers seeking transfer to other less onerous posts in view of the tremendous strain put upon them, and their families, due to this branch's recent rapid expansion. They deserve the highest of praise, which they have already been given by the Secretary and Deputy Secretary of the Ministry, who are to be sincerely thanked for their efforts in doing all they could to assist in solving the problems of this expansion.

PRIMARY MARKETING BY AFRICANS NOT MEMBERS OF CO-OPERATIVES

The duties of the Marketing Liaison Officer consist of organizing the marketing of African producers who are not members of co-operative societies. His work embraces the establishment of marketing channels where none exist and trying to improve existing channels.

He spent the whole of August, 1964, in Nairobi at a study course on marketing. The course was organized by F.A.O. and was attended by representatives from almost every country in Africa. Although Rhodesia is comparatively well advanced in marketing techniques, he found that there was a lot to learn from both the F.A.O. experts and from the experiences of the other representatives.

The majority of African-produced crops marketed outside co-operatives went through already organized channels. Special attention had to be given to certain crops grown on irrigation settlements in the Manicaland area. Details are set out below:

The Sabi Valley Irrigation Settlements

	£ s. d.
118,722 lb. net of seed beans valued at . .	3,949 9 7
1,916 lb. net of seed lettuce valued at . .	313 1 8
101 lb. net of seed tomato valued at . .	80 16 0

Murambinda Irrigation Settlement (Buhera District)

Cotton Class A	20,208 lb.
Class B	515 lb.
Class C	390 lb.
Total	21,113 lb.

This total was grown on 7¾ acres, which gives an average yield of 2,724.4 lb. per acre. The gross payment for the crop was £696 4s. 3d. and the net payment to the growers was £502 7s. 7d.

Nyamaropa Irrigation Settlement (Inyanga District)

Cotton Class A	248,805 lb.
Class B	7,702 lb.
Class C	5,315 lb.
Total	261,822 lb.

This total came from 94½ acres, giving an average yield of 2,770.6 lb. per acre. The gross price was £8,904 14s. 3d. and the net price £5,969 8s. 5d.

Nyamaropa Drylands (Inyanga District)

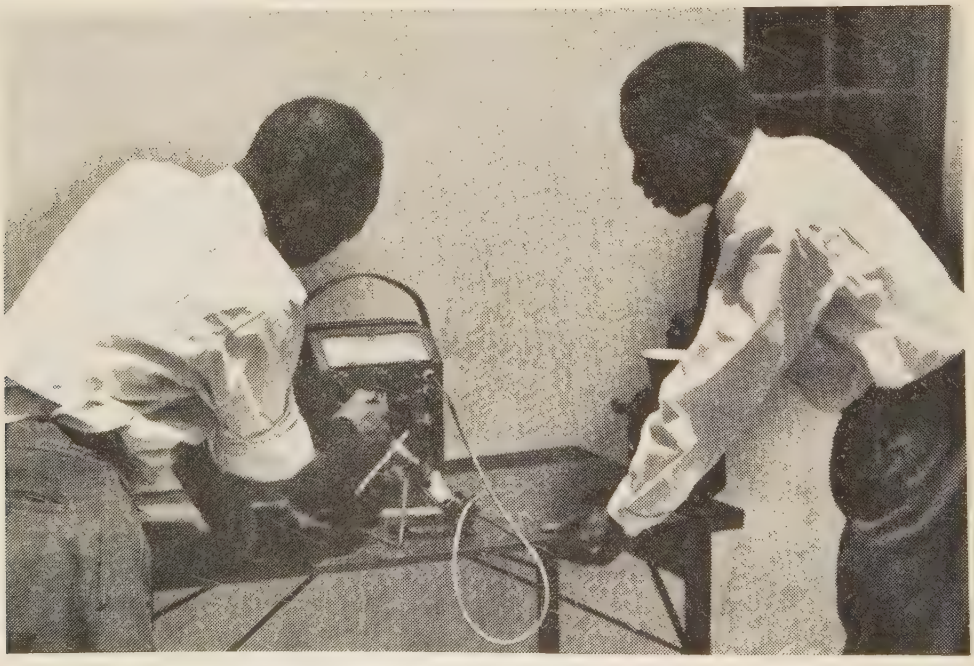
Cotton Class A	9,127 lb.
Class B	74 lb.
Class C	346 lb.
Total	9,547 lb.

This does not seem a large crop but it was grown on only three acres, thus giving the high yield of 3,182.3 lb. per acre. The gross price was £251 16s. 1d. and the net price was £224 10s. 2d.

At the end of February, the provincial marketing officer, Mr. Kloosterhuis, resigned to take up a senior appointment with a firm of seed merchants in South Africa. His services have been missed on the administrative side, but more especially in respect of seed production, which he did so much to start and foster on the Manicaland irrigation settlements. His place was taken on a temporary basis by Mr. Corser who marketed the cotton mentioned above. The Provincial Marketing Officer's post was abolished on the 30th June. Thereafter, the marketing was done by the staff of the Co-operative Section of this branch.

The reason why co-operative officers took over is because there was great interest shown in co-operative marketing. In fact the producers on the Nyamaropa Irrigation Settlement and the Nyamaropa Dryland Area and Murambinda Irrigation Settlement formed themselves into marketing co-operatives soon after the cotton marketing season. It is for this reason that the figures regarding the seed crop production of the first-named settlement appear under the co-operative section of this report. The need for the co-operative in each case was to facilitate the production and marketing of specialized crops such as seeds and cotton. On small acreages such crops are not economic, especially when one considers the spraying programme and the equipment needed therefor in the case of cotton. The growers soon realize that their best interests can be served through co-operative action.

In fact one of the major items dealt with by the Marketing Liaison Officer during the year was the consideration of the existing marketing channel for the ordinary tribesman who does not belong to a co-operative The majority of these farmers have to rely on the buying agency system to market their surplus crops. This system relies on hundreds of small traders whose main interest is their own trade and not the improvement of agriculture. Various suggestions were considered from the radical, involving the setting up of a full Government-sponsored marketing system, to a more conservative approach which postulates the



Assistant Co-operative Officers checking moisture content of maize at a Co-op. buying depot.

continued use of the buying agency system, but on a much more selective and controlled basis. No decision has yet been reached in the matter but it seems clear that the other methods of marketing open to producers, namely direct delivery by the individual or marketing co-operatively, will still be to the advantage of the producer. Furthermore, as very few Africans have large enough farms to make direct delivery economic, it seems clear that the future of marketing for the Africans lies in the co-operative movement.

Two other important considerations arose during the year. The first concerned the Rhodesian Aromatic Tobacco Growers' Association of which the Marketing Liaison Officer is a member representing the interests of the growers in the tribal areas. The association's aim was to get a better marketing system for Turkish tobacco. It was suggested that if Turkish could be sold by auction in the same way as flue-cured and Burley tobacco, the growers would probably get the best prices. There were difficulties to face; such as: the small number of buyers; Turkish could not be sold on the same floors as flue-cured and Burley, hence a completely new auction floor would be required; the small acreage grown by individual Africans would probably make selling on the auction floor more expensive with no guarantee of increased returns; and finally Africans in general seemed to prefer the present system whereby the merchants go to the African areas to buy. The question has been shelved for the time being. Nevertheless, it should be recorded here that, in 1964, Africans marketed their Burley on the Salisbury auction floors and did it successfully, getting very good prices for their crops. However, the number of African Turkish growers runs into thousands, whereas the number of Africans growing Burley did not reach 100 during 1964. Therefore the problem is different, to the extent that the wishes of a far greater number of people must be considered.

The second matter considered was the possible formation of a co-operative to run the cotton industry. The whole question revolves on whether the present system of the G.M.B. agency can be bettered. Obviously a system which brought the cotton industry from its knees to its present flourishing state must be good, nevertheless one must seek for the best. There will be much information to be sought and considered. It is unlikely that a decision will be reached until late 1965 at least. It is significant, however, that co-operation is seen as a possible better system.

During the year the Marketing Liaison Officer gave several talks to African meetings on the problems of marketing and the reasons underlying the present arrangements. This is a vital part of agricultural education, for the African producers will never be satisfied (if ever any farmer would admit satisfaction), with the arrangements for, and the results of, marketing his produce unless he knows what the system is all about.

Seed merchants were taken round the Manicaland irrigation settlements in February. The purpose of the tour was to let the producers and merchants meet together to thrash out difficulties on both sides. The tour was a success and a greater acreage for seed crops was offered. Unfortunately the weather was not good and results were disappointing. In fact, a complete failure of the water supply because of drought at the Devuli Irrigation Settlement, meant that that settlement could grow no seed crops.

Towards the end of the year, representatives from four settlements were brought to Salisbury to visit merchants' warehouses and Seed Services. They were amazed at the way in which they were shown everything and also because they realized that nothing was hidden from them. Although the visit boosted the goodwill between the growers on the one side and the merchants and Seed Services on the other, it was also educational with the aim in view of the growers ultimately taking over full responsibility for negotiating contracts with merchants instead of always relying on the agency of Government servants.

In 1964 a considerable number of Africans have been attracted by the possibilities of cotton growing. Their thoughts did not cover how their crop would be marketed. With no field staff the Marketing Liaison Officer was obliged to call upon the assistance of the co-operative officers. This assistance will be given when the crop is marketed in 1965, but there

are five isolated areas where this will not be possible. Other arrangements are being made for these areas, where it is hoped that district commissioners will help their Africans to market.

GENERAL

The sum of £5,551 has now been placed to reserve funds by African societies registered under *Chapter 225*, and this money has been invested in gilt-edged securities.

The necessity for more education of African co-operative secretaries, members of committees and members themselves is becoming a matter of urgency, but Government staff have little time to devote to it. To this end it is proposed to appoint one lady clerk to each regional office to relieve the Co-operative Officer and his staff of their clerical duties, and thus enable them to educate personnel much more extensively, so that societies can do more administration and accountancy work for themselves.

The Deputy Registrar was awarded a fellowship by the Canadian Government to study co-operatives there for about four months. The study mission was successful.

The Registrar attended a Commonwealth conference (with many observers from outside the Commonwealth) at Exeter University in Devonshire on agricultural co-operatives, land tenure and rural credit. He returned via London, Paris and Rome, collecting co-operative information, and making international contacts en route. This mission also was a success.

Pilot schemes of marketing African co-operative members' cattle direct to the Cold Storage Commission were undertaken in Salisbury and Bulawayo regions. The cattle were straight off the veld and the results were reasonable—with feeding supplied through loans by societies the results could be good.

This year 3,112 wool packs containing 1,178,393 lb. of cotton were marketed by African societies, as against 1,771 wool packs containing 643,037 lb. of cotton last year—an even greater increase is expected this year. For the first time all societies financed from their own funds cotton spraying in the Sabi Valley done for their members.

Some society chairmen in the Umtali Region have been to Gatooma to see cotton grading, buying, ginning and spinning. Others have been taken to see how their seed crops are handled in Salisbury. In Salisbury and Bulawayo some co-operative members went through the Cold Storage Commision with their cattle, and had slaughter grades and procedure explained to them. Visits were made also by farmers from Enkeldoorn and Fort Victoria regions to the Cold Storage Commission, Fort Victoria. All the Africans expressed appreciation of how the co-operatives were making this education possible for them.

This branch hopes to extend the education programme very considerably in the first half of 1965. Each regional office has £500 for this purpose donated from the African Development Fund. As soon as the clerical side of the work of the regional officers is able to be delegated to the proposed women clerks, staff will be able to concentrate on education at society level until marketing commences. Towards the end of 1964 the Regional Officer, Enkeldoorn, ran a short course for co-operative secretaries in his region with conspicuous success.

All officers report that the motor-cycle loans to co-operative assistants have proved successful.

The Tjolotjo Pig Producers' and Marketing Society is an experiment in the Bulawayo North Region to improve African pigs and to assist members to market them with Colcom. This society will later apply for membership of the Rhodesia National Pig Breeders' Co-operative Company to enable it to share in patronage bonus payments from Colcom.

Bank overdrafts have been obtained in some regions by African societies to enable them to purchase their members' crops for cash on delivery to the societies' depots. As these pilot schemes have proved most successful, this procedure is likely to be adopted by many African societies for 1965 marketing.

Two societies have instituted pilot schemes of tractor-ploughing members' lands with equipment obtained from a society communal loan. One is in the Tribal Trust Land at Nemangwe, for which second-hand equipment has been used, and the other is in the Copper Queen African Purchase Area using new equipment. Both schemes were started very late

in the year, and both are in fly-infested areas. It is too soon to draw any conclusions as to success, but the schemes are being watched with great interest as success could mean a "break through" in the difficulties experienced by Africans farming in the tsetse fly areas.

Finally it is desired to place on record the grateful appreciation of the Officer in Charge of this branch for all the assistance given to him and his staff by provincial commissioners, district commissioners, district officers, provincial conservation and extension officers, group officers, agricultural officers and their African staff, banks, Grain Marketing Board officials, transport contractors, Railway officials, all those persons who supply equipment, seed, fertilizer, sacks and service to societies, and last, but not least, to all those officers in the Ministry of Agriculture, many of whom went out of their way to help this branch establish itself in its new home.

R. J. DINNIS
Officer in Charge of the Co-operatives and Loans Branch

APPENDIX A

SHORT-TERM LOANS FOR AFRICAN MARKETING AND AGRICULTURAL SUPPLY SOCIETIES

Season		*Loans Granted*	*Percentage Repayment of Capital and Interest*
		£	%
1958–59	Agency	2,452	99·2
1959–60	Agency	9,971	98·8
1960–61	Agency	12,521	93·0
1961–62	Communal	20,026	92·8
1962–63	Communal	10,594	86·4
1963–64	Communal	15,928	68·0
1964–65	Agency	46,763	due in 1965
	Communal	15,007	due in 1965

SUMMARIES—31ST DECEMBER, 1964

MEDIUM-TERM LOANS FOR AFRICAN MARKETING AND AGRICULTURAL SUPPLY SOCIETIES BY YEARS

	Year Advanced	Original Loan	Repayments	Balances	Balances Comprised of Instalments Due, 1965–69	Balances Comprised of Overdue Instalments	Percentages Repayments of Instalments Due
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Communal	1960	2,603 6 10	1,563 7 5	1,039 19 5	318 18 11	721 0 6	68·4
	1961	20,693 6 0	11,878 19 9	8,814 6 3	4,755 0 8	4,059 5 7	74·5
	1962	23,136 9 2	9,174 8 9	13,962 0 5	9,533 7 7	4,428 12 10	67·4
	1963	19,121 15 4	4,938 10 9	14,183 4 7	11,314 7 5	2,868 17 2	63·3
		65,554 17 4	27,555 6 8	37,999 10 8	25,921 14 7	12,077 16 1	69·5
	1964	13,100 19 9	204 5 6	12,896 14 3	12,896 14 3	—	N/A
		£78,655 17 1	£27,759 12 2	£50,896 4 11	£38,818 8 10	£12,077 16 1	N/A
Agency	1964	£32,578 15 1	—	£32,578 15 1	£32,578 15 1	—	N/A

BY REGIONS (LOANS ADVANCED 1960 TO 1963 ONLY)

Salisbury N.E.	17,225 9 8	5,764 13 10	11,460 15 10	7,843 11 0	3,617 4 10	61·4
Salisbury S.W.	9,734 12 8	4,827 7 0	4,907 5 8	3,478 1 8	1,429 4 0	77·1
Umtali (drylands)	1,699 0 0	685 1 8	1,013 18 4	502 2 9	511 15 7	57·2
Umtali (irrigation)	3,319 4 4	2,442 19 9	876 4 7	752 11 4	123 13 3	95·2
Fort Victoria	15,128 6 6	6,644 17 4	8,483 9 2	5,037 18 6	3,445 10 8	65·9
Gwelo	9,633 15 2	4,493 18 5	5,139 16 9	3,757 10 5	1,382 6 4	76·5
Bulawayo	5,468 3 10	1,216 18 1	4,251 5 9	3,359 8 11	891 16 10	57·7
Rusape	3,346 5 2	1,479 10 7	1,866 14 7	1,190 10 0	676 4 7	68·6
Enkeldoorn	—	—	—	—	—	—
	£65,554 17 4	£27,555 6 8	£37,999 10 8	£25,921 14 7	£12,077 16 1	69·5

APPENDIX C

ANNUAL STATISTICS

AFRICAN CO-OPERATIVE SOCIETIES REGISTERED UNDER *CHAPTER 225* FOR MARKETING AND AGRICULTURAL SUPPLIES

	1956	1957	1958	1959	1960	1961	1962	1963	1964
Registered societies in operation	2	6	12	14	21	38	52	67	110
Buying depots	4	11	22	26	27	78	130	167	226
Membership	187	398	765	1,206	1,830	3,460	4,897	6,280	8,937
Share capital	£374	£806	£1,540	£2,440	£3,646	£6,356	£8,409	£10,186	£13,549
Crops marketed (standard bags)	—	16,354	18,569	30,607	26,813	105,309	111,590	64,992	64,856
Cotton marketed (woolpacks	—	—	—	21	15	527	952	1,771	3,112
Cash handled	£421	£31,478	£35,077	£55,580	£71,987	£220,529	£253,140	£202,058	£316,483
Reserve fund	—	£106	£147	£401	£569	£2,026	£3,757	£4,814	£5,551
Sacks issued	—	17,848	20,897	31,532	27,532	106,377	120,933	77,101	66,500
Value of fertilizer purchased	—	—	£2,160	£7,314	£7,849	£13,607	£7,593	£7,463	£48,168
Value of seed purchased	—	—	£292	£2,486	£4,672	£5,673	£4,493	£4,735	£10,790
Value of agricultural equipment purchased	—	—	£88	£512	£4,586	£18,335	£23,346	£18,822	£41,569

APPENDIX D

ANNUAL STATISTICS

CO-OPERATIVE SOCIETIES REGISTERED UNDER *CHAPTER 225* FOR OTHER THAN MARKETING

	1959	1960	1961	1962	1963	1964
Registered societies in operation	2	3	2	3	5	5
Membership	342	523	91	111	309	213
Share capital	£9,171	£10,845	£9,550	£11,632	£38,864	£37,036
Cash handled	£9,171	£40,042	£17,466	£29,599	£34,042	£13,732
Reserve fund	—	£4	£8	£12	£63	£101

AGRICULTURAL LOAN FUND

CENTRAL COMMITTEE

Type of Loans	Applications Considered		Approved		Refused		Referred	
	No.	£	No.	£	No.	£	No.	£
DISTRICT COMMISSIONERS								
Long term	136	27,201	38	6,937	11	1,959	87	18,305
Medium term	119	13,768	66	4,933	37	6,751	16	2,084
Tribal Trust Lands, medium term	142	8,974	82	2,816	39	4,124	21	2,034
Total (District Commissioners)	397	£49,943	186	£14,686	87	£12,834	124	£22,423
DISTRICT COMMITTEES								
Long term	68	13,555	42	7,322	—	—	26	6,233
Medium term	219	17,803	148	9,855	46	5,518	25	2,430
Tribal Trust Lands, medium term	247	12,608	207	10,542	26	1,708	14	358
Total (District Committees)	534	£43,966	397	£27,719	72	£7,226	65	£9,021
Sub-total (District Commissioners and District Committees)	931	£93,909	583	£42,405	159	£20,060	189	£31,444
CO-OPERATIVES								
Long term	1	368	1	368	—	—	—	—
Medium term	1,115	42,635	1,114	42,237	1	398	—	—
Short term	2,929	56,716	2,929	56,716	—	—	—	—
Total (Co-operatives)	4,045	£99 719	4,044	£99,321	1	£398	—	—
TOTAL (District Commissioners, District Committees and Co-operatives)	4,976	£193,628	4,627	£141,726	160	£20,458	189	£31,444

DISTRICT COMMITTEES—LOAN APPROVALS: SUMMARIES OF REQUISITIONS ISSUED BY PROVINCES (PROGRESSIVE TOTALS TO DATE)

	Allocation of Funds (Initial Allocation £15,000) £			*Approvals Total* £
October +2,000 November +1,000	18,000	Mashonaland North		15,988
October +10,000	25,000	Mashonaland South		21,667
	15,000	Manicaland		11,600
October +2,000 November +2,000	19,000	Fort Victoria		17,154
	15,000	Matabeleland		2,783
	15,000	Midlands		11,555
	£107,000	TOTAL		£80,747
Good Neighbour schemes (Stanning)	2,000	*Add*: Approvals by Central Committee	42,405	
	£109,000	*Less*: Amounts included in District Committees Issues, etc. (Estimate)	—	42,405
				£123,152

CO-OPERATIVE SOCIETIES—LOAN APPROVALS

	Allocation of Funds	*Region*	*Approved*			*Recommended*			*Total*			
			Short	*Medium*	*Long*	*Short*	*Medium*	*Long*	*Short*	*Medium*	*Long*	*Total*
	£		£	£	£	£	£	£	£	£	£	£
	33,050	Salisbury N.E. . .	16,675	6,109	—	1,919	4,178	—	18,594	10,287	—	28,881
	24,300	Salisbury S.W. . .	13,094	5,014	—	1,399	1,593	2,192	14,493	6,607	2,192	23,292
	11,000	Umtali	4,851	1,131	—	—	1,448	—	4,851	2,579	—	7,430
	15,500	Fort Victoria . .	6,050	4,494	—	84	1,364	368	6,134	5,858	368	12,360
	15,750	Bulawayo . . .	1,578	6,041	—	—	6,636	—	1,578	12,677	—	14,255
December + 1,000 . .	10,000	Gwelo	2,594	3,876	—	1,014	2,635	—	3,608	6,511	—	10,119
December + 2,000 . .	10,000	Enkeldoorn . . .	4,222	—	—	—	—	—	4,222	—	—	4,222
	12,000	Rusape	9,032	669	—	138	1,212	—	9,170	1,881	—	11,051
	£131,600	TOTAL . .	£58,096	£27,334	—	£4,554	£19,066	£2,560	£62,650	£46,400	£2,560	£111,610
		GRAND TOTAL . .		85,430			26,180					111,610
		Less: Refusals to date (as above) .		—			398					398
				£85,430			£25,782					£111,212

SUMMARY—LOAN APPROVALS

Allocation of Funds		*Committed*		*Availability of Funds*		*Balance Available for Issue*
£		£		£	£	£
14,750	District Commissioners	14,686	A.D.F. capital (cash)		18,857	—
107,000	District Committees	123,152	Loan Vote, 1964–65		110,000	—
131,600	Co-operative Societies	111,212	Loan Vote, 1964–65		100,000	—
2,000	Stanning Scheme (Estimate)	2,500	Loan repayments and interest received .	55,647		—
			Less: Interest payable on Loan Vote drawings to 30.6.65 (SAY) . .	5,647		
					50,000	—
£255,350	SUB-TOTAL	£251,550			278,857	27,307
50,000	Water supplies (N.P.A. areas)	10,472	Loan Vote, 1964–65		50,000	39,528
£305,350	TOTAL	£262,022			£328,857	£66,835
	Total Loan Approvals (Estimate)	£262,022				

Salisbury,
19th December, 1964.

GOVERNMENT STAFF OF THE CO-OPERATIVES AND LOANS BRANCH AS AT 31.12.64

European

1 Registrar of Co-operative Societies and Companies
1 Deputy Registrar of Co-operative Societies
1 Assistant Registrar of Co-operative Societies
9 Co-operative officers
1 Marketing Liaison Officer
1 Clerk (male)
2 Clerks (female)
1 Shorthand typist
1 Secretary of Agricultural Loan Fund
1 Clerk (male) to Agricultural Loan Fund } on Finance Officer's vote
1 Clerk (female) to Agricultural Loan Fund

20

African

9 Assistant co-operative officers
32 Co-operative assistants
1 Driver
1 Office orderly

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Department of Research and Specialist Services Report

for the period 1st December, 1963 to 30th September, 1964

GENERAL

THE NEW Southern Rhodesia Department of Research and Specialist Services was formed on 1st December, 1963, by the amalgamation of those branches and stations of the Federal Department located in Southern Rhodesia and the research sections of the Ministry of Agriculture (Southern Rhodesia).

To consolidate the Department's position and to maintain a high standard of work under the new administrative and financial conditions, a critical examination of all aspects of its research and specialist services was undertaken during the year. As a result, some minor organizational changes were made and others have been proposed which would lead to improvements in the country's agricultural research services.

The Southern Rhodesia Research Advisory Committee, set up to provide liaison between the Rhodesia National Farmers' Union, the Department of Conservation and Extension, Economics and Markets Branch and the Department of Research and Specialist Services, met to consider the broad aspects of research policy which had been formulated by the Directorate during its critical examination referred to above.

STAFF

It was expected that the Federal dissolution would cause considerable staff difficulties but in fact only 20 members of the Department terminated their service for this reason. The details of these are given below.

Senior professional officers	3
Professional officers	6*
Technical officers	9
Administrative, clerical and typists posts .	2
TOTAL	20

*Two of these were officers seconded to another department.

An additional 20 professional and 18 technical officers are at present on provisional terms of employment and it is to be anticipated that some of these will terminate their services over the next few years.

Dr. B. S. Ellis retired as Director on 30th November, 1963, after 36 years of outstanding service, and was succeeded by Mr. J. C. Raath. Due to the heavy burden of administration in the Department, its increased size and reorganization, an additional post of Assistant Director was created on 1st December, 1963. This new post and that vacated by Mr. Raath were filled by Mr. P. A. Donovan and Dr. D. H. Saunder.

Dr. H. Wild was appointed Chief Botanist and Plant Pathologist in succession to Dr. G. R. Bates, who transferred to the Public Services Board as a member. During the year Dr. H. Weinmann and Mr. G. H. Cooper retired as Chief Agricultural Chemist and Chief Poultry Officer respectively. Dr. Weinmann who served the Department well for 18 years was succeeded by Mr. R. G. Thomas while Mr. Cooper's services as Chief Poultry Officer were retained on a contract basis. Dr. D. H. Saunder was awarded the M.B.E. in the New Year Honours. The general staff position at the end of the year under review is shown in the following table. Although the overall position appears satisfactory, a number of less favourable aspects warrant mention. The numerical relationship between professional and technical research officers is unsatisfactory, with the result that professional workers are spending too much time on technical duties. It is also considered desirable that research workers as well as technical officers should attain higher qualifications before

entering the Department because of their greater value to the research services. The present grading structure makes it difficult to achieve the continuity which is so essential in research. The professional man must move, for promotion, into the administrative field at a stage in his career when he is becoming most productive in research and the technical man must leave the service after a few years if he wants to improve his financial position.

The Public Services Board has carried out an inspection of the Department's professional grades, but at the time of writing no final decisions have been made known. The inspection of technical grades is expected shortly and, in preparation for this, the Department has produced a memorandum on the need for in-service training and recommendations on grades and salaries for technical officers.

	Establishment at 30.9.64	*Appointments*		*Transfers*		*Retirals*	*Resignations*	*Vacancies at 30.9.64*
		Promotion	*New*	*From Dept.*	*To Dept.*			
Director	1	1	—	—	—	1	—	—
Assistant directors	2	2	—	—	—	—	—	—
Chiefs of branches	8	2	1	—	—	2	—	1
Officers in charge of research stations and principals of colleges	10	—	—	—	—	—	—	—
Senior professional research officers and senior lecturers	52	3	2	—	1	—	—	4
Professional research officers and lecturers	58	—	11	—	—	—	7	14
Contract professional officers	4	—	—	—	—	—	—	—
TOTAL PROFESSIONAL STAFF	135	8	14	—	1	3	7	19
Technical research officers and instructors	76	3	14	1	3	—	8	2
Meat graders, cattle graders, milk recorders and plant, fruit and grain inspectors	33	1	2	—	—	1	1	3
TOTAL TECHNICAL STAFF	109	4	16	1	3	1	9	5
Agricultural and laboratory assistants	58	—	5	—	—	—	9	5
Administrative assistants	2	1	—	—	—	—	—	—
Handymen, groundmen, orderlies and other posts	73	—	6	—	—	—	10	7
TOTAL	415	13	45	1	9	4	39	36

ITEMS OF SPECIAL INTEREST

Dr. Saunder accompanied the Deputy Secretary, Technical Services, Mr. Espach, to the U.K. and Holland on a recruiting mission for the Ministry. They visited many universities and colleges, interviewed prospective recruits and established contacts with the Department of Technical Co-operation and Overseas Settlement Bureau in London and with senior scientists at research institutes. As a result of this mission two entomologists, two plant pathologists, two soil chemists and one agronomist have since joined this Department.

The biennial meeting of S.A.R.C.C.U.S., held in Durban, was attended by Dr. O. West, Chief Pasture Research Officer and Ecologist, who is the permanent member of the Standing Subcommittee on Bush Control, and Mr. J. G. Thompson, Officer-in-Charge, Soil Survey, who is chairman of the Soil Science Subcommittee. They were members of the Rhodesia delegation, led by Mr. J. J. Duvenage, Director of Conservation and Extension, and were able to make a valuable contribution to the proceedings of the meeting.

Mr. J. A. Whellan, Chief Entomologist, took the chair at a meeting of the International Red-Locust Control Scheme at Abercorn. This meeting was very successful and demon-

strated that inter-African co-operation is still possible in the scientific sphere. Mr. Whellan was re-elected chairman for the coming year.

A number of distinguished scientists visited Rhodesia during the year. These included Dr. Hall of the Stored Products Research Institute, Dr. Thain of the Tropical Products Institute, Dr. Little of the Agricultural Research Council Weed Research Unit, all in the U.K. M. Catasche, Scientific Secretary of the Inter-African Phytosanitary Commission, came for discussions on phytosanitary work, and Dr. Kheireldin, Regional Poultry Officer for F.A.O. in Accra, visited poultry farms and Gwebi College. Mr. George Lock, O.B.E., spent six weeks in Rhodesia examining the country's potential for sisal production. The financial assistance received from the U.K. Department of Technical Co-operation in making this visit possible is greatly appreciated. Mr. H. Doggett, Senior Plant Breeder, East African Agriculture and Forestry Organization, Sorghum Section, visited Rhodesia to advise on sorghum breeding.

Following the discovery overseas that mouldy groundnuts may contain substances which are toxic to young stock and possibly harmful to man, investigations of the occurrence of toxins in the Rhodesian groundnut crop have been carried out by the Chemistry Branch for the past two years. This is a world-wide problem, but in Rhodesia only negligible amounts were found in the 1962–63 crop, although there was a greater incidence of contamination in the 1963–64 crop, possibly aggravated by drought and high temperatures. Extension advice is being given to farmers on cultural, harvesting and handling practices to reduce contamination of the crop. In conjunction with the Grain Marketing Board, the public health authorities and the Veterinary Department, precautions are being taken to ensure that edible nuts or groundnut cake contain no harmful toxins, and during the coming season research will be intensified into the effect of different cultural practices, including methods of curing and drying of the crop, in order to minimize the occurrences of mouldy nuts, which will no longer be marketable for human consumption or incorporation into animal feeds.

An important event of the year was the passing out of the first African diploma graduates from Chibero Agricultural College. The graduation ceremony was attended by Sir Humphrey and Lady Gibbs and the Minister of Agriculture.

Funds were made available for new buildings at the Salisbury Agricultural Experiment Station and plans are now being prepared for the long-awaited new entomology, agronomy and soil science laboratories.

A particular feature of the year has been the rapid development of the south-eastern lowveld for irrigation. An important contribution to this development has been made by the Department in the form of soil surveys carried out by the Soil Survey Section of the Chemistry Branch in co-operation with the Ministry of Water Development.

The biometrical service of the Agricultural Research Council has proved of immense value to workers in this Department, who are now making increasing use of the advanced computational facilities and the expert statistical advice provided by the Council. A biometrician has recently been appointed to the staff of the Department of Research and Specialist Services. He will assume his duties early in the coming year and arrangements have been made for him to work initially with the Council's biometry team in order to gain experience in the application of advanced statistical techniques to agricultural problems. It is hoped that this will lead to still closer co-operation between the Council and the Department and be to the benefit of both.

COMMITTEES AND BOARDS

The Director or assistant directors were members of the following:

Rhodesia Research Advisory Committee (as chairman).
Fertilizer Advisory Committee (as chairman).
Agricultural Research Council Consultative Committee on Agriculture and Animal Husbandry.
R.A.J. Editorial Committee.

Rhodesian Journal of Agricultural Science, Editorial Board.
Tobacco Research Board.
Scientific Council of Rhodesia.
Hydrology Co-ordination Committee.
Working Party on Requirements of Agricultural Lime (as chairman).
Yellow Maize Committee (as chairman).
Fibre Production Committee (as chairman).
Chiredzi Research Advisory Committee.
Sabi Valley Development Farm Committee.
Drainage Advisory Committee.
Eastern Highlands Research Station Liaison Committee (as chairman).
Rhodes Inyanga Orchards Liaison Committee (as chairman).
Plant Introduction Committee (as chairman).
Hybrid Maize Seed Management Committee.
Standing Technical Committee on Soya Beans (as chairman).
Technical Training Committee (as chairman).

VISITS OUTSIDE RHODESIA

Mr. J. A. Whellan attended the sixteenth meeting of the International Red-Locust Service at Abercorn in July. He attended a joint meeting of representatives of Rhodesia, Zambia and Malawi on phytosanitary matters. He also visited Lourenço Marques in June for discussions with the Portuguese authorities.

Mr. D. J. W. Rose, whilst on leave, attended the eighth Commonwealth Entomology Conference in London and also visited research stations in the U.K.

Mr. J. W. Walsh attended the fourth International Course on Vocational Education and Training in Agriculture. This was held in Switzerland in September.

Dr. H. Wild visited Luanda for discussions with Professor Barbosa on the *Flora Zambesiaca*.

Mr. G. W. Herd visited the Stellenbosch Elsenburg College of Agriculture in South Africa to study work on stem rust of wheat.

Mr. I. G. Thompson attended the ninth ordinary meeting of S.A.R.C.C.U.S. in Durban in June.

Dr. O. West also attended the ninth ordinary meeting of S.A.R.C.C.U.S., and visited Zambia for a seminar held at the A.R.C. Laboratories at Mount Makulu.

Dr. D. H. Saunder went to the U.K. and Holland on a recruiting mission.

Dr. W. L. Fielding undertook a U.N./F.A.O. assignment in agricultural education in Malaysia and was a member of a U.N.E.S.C.O. team which visited Bechuanaland, Basutoland and Swaziland.

Mr. A. B. Edwards, whilst on leave in the U.K., made a study of the efficiency of milking machines.

Mr. P. E. Parkyn, whilst on leave, studied the manufacture of Cheshire cheese and modern packing methods in the U.K.

Mr. J. A. Taylor visited Kenya in August to study coffee growing.

Mr. D. P. Hanham spent three weeks at Onderstepoort training in culture and recognition of the internal parasites of cattle and sheep.

Mr. J. R. Tattersfield was in Pretoria and Potchefstroom for one week on soya bean breeding.

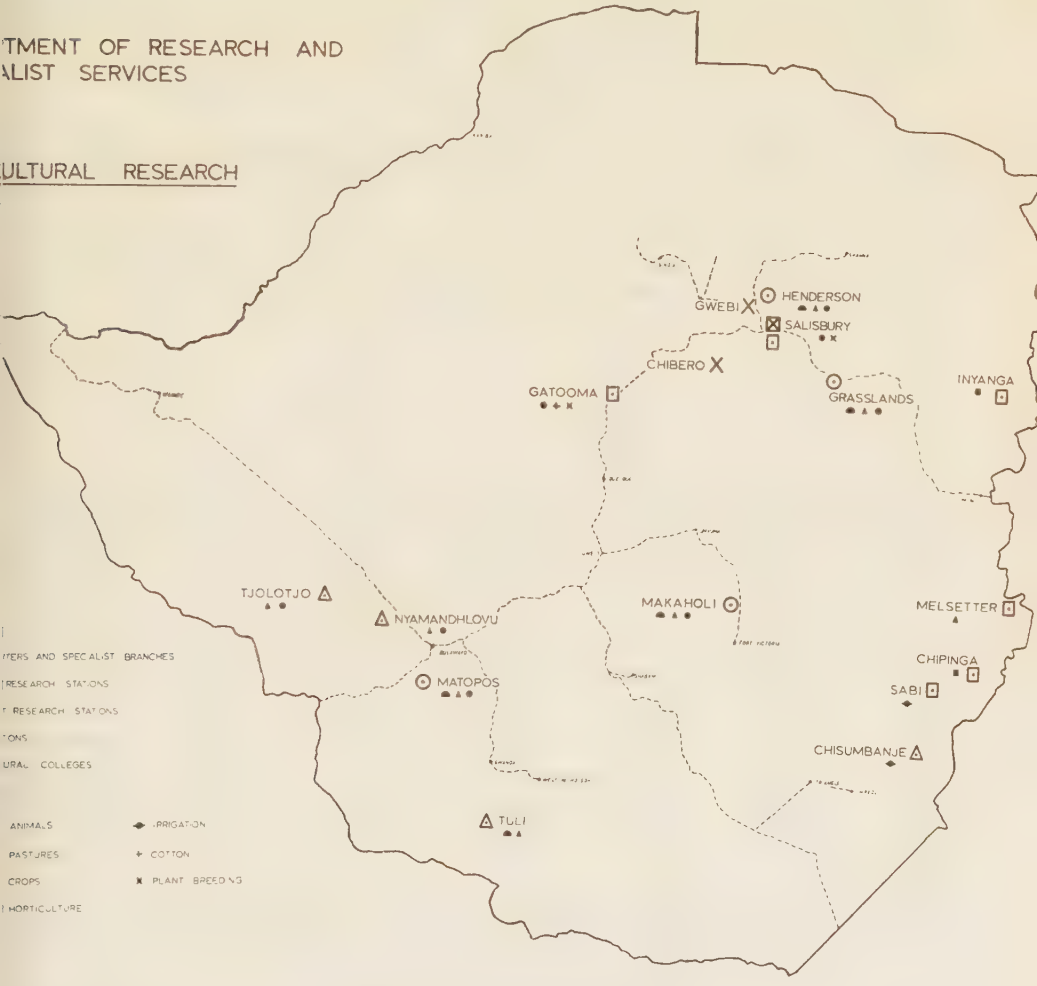
Mr. H. D. L. Corby and Mr. W. P. L. Sandman visited the factory of the S.A. Legume Inoculant Co., in Stellenbosch, whilst on leave.

Mr. H. K. Ward presented a paper on "The Potential of Indigenous Cattle" to the Zambia Ministry of Agricultural Colloquy at Mount Makulu on 3rd February, 1964.

Mr. S. W. Nelson has left for the U.S.A. to study for a M.Sc. degree at the University of North Carolina. He visited Spain on the way, inspecting plant breeding stations near Madrid.

Mr. J. O. Meikle had discussions in the Republic of South Africa in February on methods and techniques being used on their work with legumes.

Dr. F. E. M. Gillham visited Europe from 23rd May to 23rd June, 1964. In Rome he attended the joint F.A.O.- I.A.E.C. conference on the uses of induced mutations in plant breeding. Visits were also made to France and England.



SPECIALIST BRANCHES

ANIMAL HUSBANDRY

The past season has been a difficult one, climatically. The rains came in November but occurred mostly in the form of irregular light showers until about February, after which very little rain fell. There was little run-off and as early as January many farmers in the southern parts of the country were experiencing difficulties in watering their stock. Drought relief measures were introduced in March. The Cold Storage Commission assisted in the transfer of large numbers of cattle from drought-stricken farms. These cattle were either slaughtered or distributed under the grazier agreement scheme.

From a marketing point of view conditions were more favourable. Owing to a drought in the Argentine and a general rise in the standard of living in the Western European countries in particular, overseas meat prices increased by over 20 per cent. as compared with prices the previous year. There is no guarantee that prices will remain at this level. But it is only reasonable to anticipate that for a time to come the price of meat will remain somewhat above the 1962–63 levels.

To give producers the benefit of this favourable export market and to stimulate the production of beef the Government has agreed to increase the guaranteed producer price of beef by 10s. per 100 lb. c.d.w. as from 1st January, 1965.

The Beef Industry

From the figures given in Table 1 it can be seen that the numbers of European- and African-owned cattle increased from 1,553,000 and 2,093,000 in 1959 to 1,624,000 and 2,227,000 at the end of 1963, respectively.

TABLE 1.—NUMBERS OF EUROPEAN- AND AFRICAN-OWNED CATTLE IN RHODESIA (IN THOUSANDS)

Year	*European-owned*	*African-owned*	*Total*
1959	1,553	2,093	3,646
1960	1,552	1,954	3,506
1961	1,599	1,988	3,587
1962	1,626	2,091	3,717
1963	1,624	2,227	3,851

The herd composition of European-owned stock is given in Table 2. Unfortunately no comparable records are available on African-owned herds. The submission of such data will become compulsory under the newly introduced Animal Health Act and will be of great assistance in planning beef production in the African-occupied areas.

TABLE 2.—HERD COMPOSITION OF EUROPEAN-OWNED BEEF CATTLE

Year	*Number of Cows*	*Number of Heifers*	*Number of Calves*	*Number of Oxen*	*Number of Bulls*	*Totals*
1959	500,337	213,459	246,620	463,134	23,488	1,447,038
1960	518,484	223,414	235,571	441,613	23,364	1,442,446
1961	553,289	208,402	254,763	447,041	23,294	1,486,789
1962	557,866	201,643	289,966	435,956	23,441	1,508,872
1963	580,000	221,716	241,227	436,517	22,806	1,502,326

From Table 2, it will be seen that the composition of European-owned herds has remained fairly constant over the past five years. In fact, analyses show that for the past 20 to 30 years European herds have consistently included approximately 37 per cent. cows, 14 per cent. heifers, 17 per cent. calves, 30 per cent. steers and 2 per cent. bulls. In this connexion it is evident that the low calving or weaning rate, which seems to remain fairly constant at 50 per cent., must be considered as one of the most important single factors retarding the development of the industry. This factor becomes more and more serious as the area available for increasing beef production decreases.

Towards the end of the period under review a committee was appointed to examine how the production of beef could best be increased on a national basis. Their findings have not yet been published.

SUPPLIES OF SLAUGHTER STOCK

Table 3 shows that over the past five years the total number of cattle slaughtered in European areas increased from 345,894 in 1959 to 368,060 in 1963.

TABLE 3.—CATTLE SLAUGHTERINGS

Year	*No.*	*Year*	*No.*
1959	345,894	1962	352,110
1960	357,395	1963	368,060
1961	341,753		

For comparative purposes the grade of cattle slaughtered by the Cold Storage Commission and private butchers in the controlled areas for the past three years is given by sex in tables 4, 5 and 6.

TABLE 4 (a).—NUMBER OF CATTLE SLAUGHTERED BY THE COLD STORAGE COMMISSION FOR THE YEAR ENDED 30th SEPTEMBER, 1964

Grade	*Oxen*	*Cows and Heifers*	*Bulls*	*Total, 1964*	*Per Cent.*
Rhodesia's Best	10,249½	916		11,165½	4.4
Imperial	18,452½	1,299½		19,752	7.8
Standard A	55,769½	7,982½		63,752	25.0
G.A.Q.	43,754	34,436		78,190	30.7
F.A.Q.	22,534	16,683½		39,217½	15.4
Compound	14,111½	13,534½	5,554	33,200	13.0
Inferior	1,758	7,290	367	9,415	3.7
TOTAL	166,629	82,142	5,921	254,692	100.0

TABLE 4 (b).—NUMBER OF CATTLE SLAUGHTERED BY PRIVATE BUTCHERS IN THE CONTROLLED AREAS FOR THE YEAR ENDED 30th SEPTEMBER, 1964

Grade	*Oxen*	*Cows and Heifers*	*Bulls*	*Total, 1964*	*Per Cent.*
Rhodesia's Best	159	92		251	0.7
Imperial	521	176		697	1.9
Standard A	2,803½	2,010		4,813½	13.1
G.A.Q.	3,737	8,166½		11,903½	32.4
F.A.Q.	2,404½	5,230½		7,635	20.8
Compound	2,182	5,892	1,593	9,667	26.3
Inferior	185	1,536	43	1,764	4.8
TOTAL	11,992	23,103	1,636	36,731	100.0

TABLE 5 (a).—NUMBER OF CATTLE SLAUGHTERED BY THE COLD STORAGE COMMISSION FOR THE YEAR ENDED 30th SEPTEMBER, 1963

Grade	*Oxen*	*Cows and Heifers*	*Bulls*	*Total, 1963*	*Per Cent.*
Rhodesia's Best	7,284	608½		7,892½	3.1
Imperial	13,680½	859		14,539½	5.7
Standard A	55,929½	5,367		61,296½	24.4
G.A.Q.	49,560	31,535½		81,095½	31.8
F.A.Q.	26,625½	20,958		47,583½	18.7
Compound	15,332	13,806	4,704½	33,842	13.3
Inferior	1,758½	5,672	276½	7,707½	3.0
TOTAL	170,170	78,806	4,981	253,957	100.0

TABLE 5 (b).—NUMBER OF CATTLE SLAUGHTERED BY PRIVATE BUTCHERS IN THE CONTROLLED AREAS FOR THE YEAR ENDED 30th SEPTEMBER, 1963

Grade	*Oxen*	*Cows and Heifers*	*Bulls*	*Total, 1963*	*Per Cent.*
Rhodesia's Best	155	77		232	0.7
Imperial	644	154		798	2.3
Standard A	2,865	1,553		4,418	12.9
G.A.Q.	3,769½	6,458½		10,228	29.8
F.A.Q.	2,369½	4,920		7,289½	21.2
Compound	1,974	5,923½	1,357	9,254½	27.0
Inferior	198	1,816	64	2,078	6.1
TOTAL	11,975	20,902	1,421	34,298	100.0

TABLE 6 (a).—NUMBER OF CATTLE SLAUGHTERED BY THE COLD STORAGE COMMISSION FOR THE YEAR ENDED 30th SEPTEMBER, 1962

Grade	*Oxen*	*Cows and Heifers*	*Bulls*	*Total, 1962*	*Per Cent.*
Rhodesia's Best	9,590	737		10,327	4.3
Imperial	15,591	781½		16,372½	6.7
Standard A	62,468½	5,030		67,498½	27.8
G.A.Q.	53,594½	25,777½		79,372	32.7
F.A.Q.	24,482½	13,956½		38,439	15.8
Compound	12,840½	9,600	2,347	24,787½	10.2
Inferior	1,523	4,537½	102	6,162½	2.5
TOTAL	180,090	60,420	2,449	242,959	100.0

TABLE 6 (b).—NUMBER OF CATTLE SLAUGHTERED BY PRIVATE BUTCHERS FOR THE YEAR ENDED 30th SEPTEMBER, 1962

Grade	*Oxen*	*Cows and Heifers*	*Bulls*	*Total, 1962*	*Per Cent.*
Rhodesia's Best	198	56		254	0.8
Imperial	659½	201½		861	2.8
Standard A	2,821½	1,276		4,079½	13.1
G.A.Q.	3,705	5,602		9,307	29.9
F.A.Q.	2,441	4,168		6,609	21.2
Compound	1,959	4,880½	1,331	8,170½	26.2
Inferior	190	1,610	68	1,868	6.0
TOTAL	11,974	17,794	1,399	31,149	100.0

From the above tables it can be seen that the commission slaughterings increased from 242,959 in 1962 to 254,692 at the end of September, 1964. Similarly, during the past year butchers increased their slaughterings by 5,582 head as compared with the 1962 season.

From an examination of tables 4, 5 and 6 it will further be seen that while over the past three years the number of oxen slaughtered by private butchers has remained fairly constant the Cold Storage Commission slaughterings of male stock have dropped from 180,090 head in 1962 to 166,629 head in 1964. This may largely be attributed to a reduction in the number of slaughter stock received from Bechuanaland.

The total number of female stock slaughtered has increased from 78,214 in 1962 to 105,245 at the end of the period under review. This increase seems to be in accordance with the increase in cattle numbers and the normal culling rates of female stock.

Pigs

The increase recorded in European- and African-owned pigs over the past five years are given in Table 7.

TABLE 7.—NUMBER OF EUROPEAN- AND AFRICAN-OWNED PIGS IN RHODESIA (IN THOUSANDS)

Year	*European-owned*	*African-owned*	*Total*
1959	61	47	108
1960	62	42	106
1961	70	42	112
1962	70	63	133
1963	64	66	130

As predicted last year the number of European-owned pigs dropped by 6,000 over the past year, while over the same period the number of African-owned pigs increased by 3,000 to its present record figure of 66,000 head since Federation in 1953.

The drought may have slowed down African pig production, particularly in the lower rainfall areas. The rearing of pigs is, however, well fitted to peasant systems of farming and rapid increases may be expected in African pig production in future.

The numbers and grades of pigs slaughtered over the past year by Colcom Products Central Co-operatives Ltd., and private butchers are given in Table 8.

TABLE 8 (a).—NUMBER OF PIGS SLAUGHTERED BY COLCOM PRODUCTS CENTRAL CO-OPERATIVES LTD., 1963–64

Grade	*Baconers*	*Porkers*	*Cutters*	*Underwt. Pigs*	*Overwt. Pigs*	*Sows*	*Boars*
A	45,329	9,513	2,266	—	—	4,479	351
B	5,985	3,989	1,941	197	—	1,016	76
C	1,371	—	—	—	—	—	—
L	1,341	1,099	100	111	—	—	—
X	3,441	8,932	6,242	1,868	—	—	—
Inf.	241	1,602	457	1,640	—	326	—
TOTAL	57,708	25,135	11,006	3,816	1,821	5,821	427

Total for year ending September, 1964: 105,734.
Total for year ending September, 1963: 104,484.

TABLE 8 (b).—NUMBER OF PIGS SLAUGHTERED BY PRIVATE BUTCHERS IN THE CONTROLLED AREAS, 1963–64

Grade	*Baconers*	*Porkers*	*Cutters*	*Underwt. Pigs*	*Overwt. Pigs*	*Sows*	*Boars*
A	378	1,748	910	—	—	914	—
B	67	1,237	604	368	—	672	—
C	13	—	—	—	—	—	—
L	10	154	96	32	—	—	—
X	1,945	9,828	5,040	4,138	—	—	—
Inf.	98	1,673	339	2,525	—	—	—
TOTAL	2,511	14,640	6,989	7,063	—	1,638	—

Total for year ending September, 1964: 32,841.
Total for year ending September, 1963: 24,462.

From these figures it can be seen that, compared with the previous year, both Colcom Products Central Co-operatives and private butchers increased their slaughterings by 1,250 and 8,379 head respectively.

PIG PROGENY TESTING

From 1st May, 1964, the Pig Industry Board became responsible for progeny testing of pigs in this country. During the past year 31 boar litter groups were tested and the average results for the year were as follows:

	Landrace	*Large White*
Age in days at slaughter	177.1	177.7
Gain per day (lb.)	1.53	1.58
Feed conversion	3.50	3.18
Length of carcass (mm.)	859.7	826.2
Back — at shoulder (mm.)	40.8	43.9
mid-back (mm.)	20.9	20.1
rump (mm.)	25.2	25.5
Eye muscle area (mm.2)	2,914	2,972

Sheep

The increases recorded in the number of European- and African-owned sheep from 1959 to 1963 are given in Table 9.

TABLE 9.—NUMBER OF EUROPEAN- AND AFRICAN-OWNED SHEEP IN RHODESIA (IN THOUSANDS)

Year	*European-owned*	*African-owned*	*Total*
1959	161	154	315
1960	188	131	319
1961	201	161	362
1962	209	179	388
1963	204	183	387

It can be seen that the number of European-owned sheep dropped from 209,000 in 1962 to 204,000 in 1963, while over the same period the number of African-owned sheep increased from 179,000 to 183,000 head. Farmers continued to show considerable interest in sheep production and it is doubtful whether any importance can be attached to this drop in European sheep production.

The numbers and grades of sheep slaughtered by the Cold Storage Commission and private butchers for the year ending 30th September, 1964, are given in Table 10.

TABLE 10.—NUMBER AND GRADES OF SHEEP SLAUGHTERED IN THE CONTROLLED AREAS OF RHODESIA

Commission Slaughterings					*Butcher Slaughterings*				
Lamb	*Number*	*Mutton*	*Number*	*Rams*	*Lamb*	*Number*	*Mutton*	*Number*	*Rams*
Super	820	Mutton 1	5,352		Super	299	Mutton 1	4,215	
Lamb 1	2,700	Mutton 2	3,676		Lamb 1	1,109	Mutton 2	2,975	
Lamb 2	6,814	Mutton 3A	5,297		Lamb 2	5,195	Mutton 3A	3,573	
Lamb 4	1,227	Mutton 3B	2,646		Lamb 4	900	Mutton 3B	1,787	
		Mutton 4	2,683				Mutton 4	1,177	
TOTAL	11,561		19,654	763		7,503		13,727	1,705

Totals 1964—Cold Storage Commission, 31,978: butchers, 22,935.
Totals 1963—Cold Storage Commission, 17,311: butchers, 26,589.

From the above it can be seen that during the past season 54,913 sheep were killed in the controlled areas, as compared with 43,900 head the previous year, furthermore it can be seen that the Cold Storage Commission slaughterings increased by 14,667 while the number of sheep killed by butchers dropped by 3,654 head.

Research

The livestock research programme of the branch was continued and is reported in detail under the various research stations.

At the Matopos Research Station extensive studies are in progress to determine the effect of environmental influences on the selection of stock for economically important characters.

Also, physiological studies are being made to determine how further improvements in the utilization of available feeds can be obtained. These include studies of the effect of internal parasites on animal production and their control.

At Henderson Research Station special attention is being given to ruminant physiology and at Grasslands and Makoholi various short-term trials are being conducted to determine the various factors limiting cattle and sheep production in the eastern parts of the country.

The Tuli and Tjolotjo stations in Matabeleland are primarily engaged in the improvement of the indigenous stock and this work is progressing satisfactorily.

Publications

T. H. Vorster. "Factors Influencing the Growth, Production and Reproduction of Different Breeds of Beef Cattle under Range Conditions in Southern Rhodesia." D.Sc. thesis (Stellenbosch University).

DAIRY

Dairying Season

Dairy farmers have had to contend with a very difficult year. Crops at the beginning of the season looked promising but the drought from the middle of January onwards reduced output to a fraction of the anticipated yields and the cold winter only added to the producers' difficulties. Milk production costs under these circumstances inevitably increase, and with the decrease in producer prices for milk the overall position was not very encouraging.

Production of Dairy Produce

In spite of the difficult season preliminary figures indicate an overall milk production increase of 1,340,000 gallons, as compared with the previous year. This expansion is largely accounted for by increased whole milk supplied to the Dairy Marketing Board.

Farm butterfat production remained at just over one million pounds and the increased quantity of butter manufactured was due to the greater volume of milk separated to meet the demand for skim milk and skim milk products. Manufacture of butter now exceeds local requirements and if past milk production trends continue the surplus of butter is likely to increase, unless whole milk sales show a marked improvement and cultured milk containing butterfat displaces to some extent cultured skim milk. Although the small surplus of butter was not difficult to dispose of, the position could have been quite different if large quantities had been involved and especially if climatic conditions had been favourable in the recognized dairying countries of the world and adjacent territories for normal production.

Sales of whole milk continued to decline and was a disturbing feature in so far as the future prosperity of the industry was concerned. Sales of whole milk to Africans, which in recent years has shown an improvement, suffered a setback as a result of boycotts in certain African townships.

The demand for cultured skim milk known as Lacto continued to increase and provided a valuable outlet for milk. A new product, similar to Lacto but containing one or two per cent. butterfat, was introduced and sales were encouraging. Developments along these lines could help in avoiding problems associated with the disposal of surplus butter.

Sales of skim milk powder continued to increase and substantial importations were necessary to meet the demand. Various control measures and price changes were introduced during the year but the effect of these on sales is not yet known.

Production figures for the main commodities are given in Table 1. These figures do not include butter and cheese produced on farms which are relatively small.

TABLE 1.—DAIRY PRODUCTION, 1920–64

Year	Butter (1,000 lb.)	Cheese (1,000 lb.)	Milk used for Dried Milk (a) (1,000 galls.)	Liquid Milk (b) (1,000 galls.)	Total (1,000 galls.)
1920	600	79	—	258	2,000
1930	1,768	163	—	1,008	6,100
1940	1,686	383	—	2,095	6,910
1950	900	394	—	5,270	9,000
1955–56	1,083	2,168	—	8,050	13,202
1960–61	2,899	1,704	2,974	9,353	19,300
1961–62	3,074	1,845	3,859	9,690	20,700
1962–63	2,984	2,240	3,773	9,518	21,000
1963–64 (c)	3,127	2,882	4,798	9,288	22,300

(a) Milk used for skim milk powder production which started in 1957 and whole mil powder production which started in 1960.

(b) Milk available for liquid milk, fresh creams and ice cream.

(c) Preliminary figures.

Table 2 shows the number of suppliers and total intake to the Dairy Marketing Boarc The figures follow the familiar pattern of recent years, showing a decreasing number c producers supplying an increasing quantity of milk. The increase of 8.2 per cent. over thi previous year's intake far exceeds the corresponding figure of 1.5 per cent. for the 1962–6 season.

TABLE 2.—DAIRY MARKETING BOARD

Year	Number of Suppliers (August)	Total Milk Supplied (Gallons)
1955–56	403	8,852,000
1959–60	531	13,815,000
1960–61	525	14,307,000
1961–62	527	15,236,000
1962–63	502	15,472,000
1963–64	491	16,745,000

CREAMERIES, BUTTER PRODUCTION AND CONSUMPTION

Butter was manufactured at Umtali, Salisbury and Gwelo. Small quantities were als produced on farms in remote areas but are not included in the production figures.

TABLE 3.—PRODUCTION AND APPARENT CONSUMPTION OF BUTTER

Year	Production (1,000 lb.)	Apparent Consumption (1,000 lb.)	(−) Shortfall met by Importation (+) (1,000 lb.) or Surplus
1950–51	767	2,643	− 1,876
1956–57	1,398	3,997	− 2,599
1960–61	2,899	3,265	− 366
1961–62	3,074	3,200	− 126
1962–63	2,984	3,250	− 266
1963–64	3,127	2,689*	+ 439

*Estimated on 8 months' trade figures.

Production has shown a steady increase and exceeds the estimated apparent consumptio for the country. The surplus was attributed not only to increased production but also t decreased sales. As indicated earlier increased butter production was due to increased separa tion of whole milk and not to increased butterfat supplies from producers.

Exports to Moçambique and the Republic of South Africa helped to reduce stocks b 247,000 lb. and further consignments were being prepared for the Republic of South Africa

At the close of the season stocks on hand had been reduced to quantities required for the local market.

Butterfat prices were reduced by 2d. per lb. in all grades as from July, 1964 (Rhodesia Government Notice No. 512 of 1964) and these should benefit the Dairy Marketing Board financially and reduce losses from butter manufacture.

Maximum retail prices for first and second grade butter remained unchanged and there was no control on other grades of butter or butterfat.

All butter was graded before sale and comparative figures of grades as a percentage of total production over a number of years are given in Table 4.

TABLE 4.—BUTTER GRADES AS PERCENTAGES OF TOTAL MANUFACTURE

Year	*First Grade (per cent.)*	*Second Grade (per cent.)*	*Third Grade (per cent.)*
1960–61	93.0	5.0	2.0
1961–62	90.0	8.0	2.0
1962–63	87.0	11.0	2.0
1963–64	87.0	11.0	2.0

The sale of unsalted butter to a local manufacturer, for producing margarine containing 10 per cent. butter, continued, but was supplied from Salisbury rather than Gwelo as it is more convenient to do so.

CHEESE FACTORIES: CHEESE PRODUCTION: CHEESE CONSUMPTION

Six factories were registered for cheese manufacture and include four operated by the Dairy Marketing Board at Bulawayo, Gatooma, Salisbury and Umtali, and the Gazaland Cheese Factory, Chipinga. The sixth factory, which is located at Shabani, was registered for the first time in March and specializes in the manufacture of Greek varieties of cheese.

Production at Chipinga showed a marked increase and this trend is expected to continue. Production during the year under review amounted to 328,000 lb. showing a 22 per cent. increase over the previous year's manufacture. Additional manufacturing and storage facilities were installed to cope with the situation.

At Umtali the main product of manufacture was Gouda cheese, which was disposed of on the local and Salisbury markets. Gatooma, on the other hand, specialized in Roquefort cheese and catered for all the country's requirements.

The production of Hallumi varieties of cheese commenced at the Rhodesian Cheese Manufacturing Factory, Shabani, after registration of premises in March and the industry was protected by imposing restrictions of imports. It is difficult at this stage to give an indication of the demand for these products but they are not expected to be very great.

The processed cheese plant referred to in the last report was installed at Bulawayo. Sales of processed cheese showed a marked increase, although small in comparison with sales of the popular varieties, Gouda and Cheddar.

The only other varieties manufactured in the territory were Cheshire, Cream and Cottage cheeses.

Cheese production exceeded demand, but the surplus was being disposed of quite easily to adjoining territories, in particular the Republic of South Africa.

All Cheddar cheese was graded by dairy officers before sale. Quality was maintained and grading figures over a number of years are given in Table 5.

TABLE 5.—CHEDDAR CHEESE GRADING AS A PERCENTAGE OF TOTAL CHEESE GRADED

Year	*First Grade*	*Second Grade*	*Third Grade*
1960–61	93.5	5.8	0.7
1961–62	97.0	2.8	0.2
1962–63	96.7	3.1	0.2
1963–64	96.1	3.9	0.0

Wholesale cheese prices remained unchanged and continued at 2s. 11d. per lb. for first grade Cheddar and Gouda cheeses. Baby Gouda cheese commanded a slightly higher price at 3s. 2d. per lb. Roquefort cheese in heads sold at 3s. 9d. per lb. and processed cheese in blocks at 3s. 3d. per lb.

Milk Supplies and Milk Prices

As mentioned earlier in the report there was a significant increase in milk supplies to the Dairy Marketing Board and intake greatly exceeded whole milk consumption. The manufacture of increasing quantities of surplus milk had a depressing effect on producer milk prices and this trend is expected to continue if milk production increases without a corresponding increase in whole milk sales.

Table 6.—DAIRY MARKETING BOARD

Year	*Total Milk Intake (1,000 galls.)*	*Apparent Consumption as Whole Milk (1,000 galls.)*	*Surplus over Whole Milk Requirements (1,000 galls.)*
1960–61	14,307	7,162	7,145
1961–62	15,236	7,154	8,082
1962–63	15,472	7,036	8,436
1963–64	16,745	6,783	9,962

Until the 1st July, 1964, producer prices were calculated according to the recognized formula based on guaranteed seasonal prices for milk sold as whole milk, plus a safety margin, and net realization value for the remaining surplus. As from 1st July the same principle was followed, except that producers received for surplus milk the actual net realization value paid in the 1963–64 season in Rhodesia, plus 0.4d. per gallon or 21d. per gallon, whichever was the greater. This guarantee remains operative until the 30th June, 1965, by which time future pricing and marketing arrangements will have been determined.

The actual prices paid for milk supplied to the Dairy Marketing Board for the last two years are given in Table 7.

Table 7.—DAIRY MARKETING BOARD

Month	*Standard Price per gallon 1963–64*	*Actual Average Pay-out without Quality Bonus (per gallon) 1963–64 (a)*	*1962–63 (b)*
October	51	35.0	36.7
November	51	33.4	36.4
December	37	25.7	26.4
January	37	25.6	26.8
February	37	26.7	28.0
March	47	32.1	33.8
April	47	33.0	33.9
May	47	31.9	34.0
June	47	32.7	34.9
July	51	35.5	36.9
August	51	35.0	36.4
September	51	34.9	35.6

(a) Prices subject to adjustment when actual average realization value for surplus milk is determined by the Dairy Marketing Board.

(b) Prices to June include supplementary payment on surplus milk.

The retail price for milk in the main towns remained unchanged at the controlled price of 8d. per pint.

Fresh Cream

The demand was met by producer retailers and the Dairy Marketing Board. No reliable estimate can be made of total consumption but sales by the Dairy Marketing Board showed an increase of 7 per cent.

Dried Milk Powder

The demand for skim milk powder continued to increase and large importations were necessary to meet the shortfall. Sales by the Dairy Marketing Board in this territory increased by approximately 28 per cent.

In July the Dairy Marketing Board were granted the monopoly of importing skim milk powder in bulk and at the same time the local wholesale prices of roller and spray dried powder were increased to 1s 3d and 1s. 9d. respectively. At this stage the Dairy Marketing Board discontinued producing small packs and the retail business was taken over by private enterprise.

In order to protect the local market against importations in small packs an effective duty was introduced to cover this contingency. The duties and restrictions were introduced under the provisions of Rhodesia Government Notices Nos. 511, 513 and 514.

Sales of milk to Nestlés for the manufacture of whole milk powder and baby food specialities continued and increased to over two million gallons. The increase follows a demand from adjacent territories, in particular the Republic of South Africa, for these products.

Sterilized Milk

This product was produced by the Dairy Marketing Board at Bulawayo. Sales were disappointing although a slight improvement over last year's figures was evident.

Ice Cream and Other Frozen Confection

The two main producers were the Dairy Marketing Board and Lyons. Sales by the Dairy Marketing Board continued to increase, especially frozen confection which includes fruit and milk lees. Even though the Dairy Marketing Board was no longer connected with the dairy industry in Zambia after the 1st January, 1964, sales of their products in this category continued.

Dairy Bonus Scheme

Notice of termination of the scheme was given with effect from the 1st December, 1963, and will terminate on the 30th November, 1967. The scheme has been in operation since 1954 and bonus payments of 1s. and 9d. per lb. have been paid for first- and second-grade butterfat respectively and 6d. per gallon of cheese milk. The bonus will remain at this level until the 30th November, 1964, but thereafter bonuses will be reduced annually as follows:

	Butterfat, pence per lb.		*Milk for Cheese Manufacture,*
	1st grade	*2nd grade*	*pence per gallon*
1st December, 1964, to 30th November, 1965 ...	9d.	6¾d.	4½d.
1st December, 1965, to 30th November, 1966 ...	6d.	4½d.	3d.
1st December, 1966, to 30th November, 1967 ...	3d.	2¼d.	1½d.

Milk Recording

Analysis of lactation records punched on to Hollerith cards is progressing satisfactorily. The first results of these investigations will be published in the near future. In this connexion the Rhodesia National Farmers' Union made a grant of £500 in June to enable time to be hired on an electronic computer, which has made it possible for more complex analyses to be performed.

The number of herds using the facilities of the Milk Recording Scheme has continued to fall due mainly to dispersal sales but the number of cows recorded has again not decreased proportionately.

The following tables 8 and 9 give the production figures for winners of competitions and average production per cow in test respectively in recent years. The 1962–63 figures show an increase of 11 gallons in average milk yield over the previous year.

TABLE 8.—PRODUCTION OF WINNING HERDS IN MILKING COMPETITIONS (AVERAGE OF THE BEST FIFTEEN COWS IN THE HERD)

Year	*Milk Section lb.*	*Butterfat Section lb.*
1959–60	17,497	601.2
1960–61	16,272	593.3
1961–62	17,077	606.5
1962–63	17,802	600.0

TABLE 9.—AVERAGE PRODUCTION PER COW: PEDIGREE AND GRADE HERDS

Year	*No. of Lactations*	*Average Milk Production per cow (lb.)*	*Average Butterfat Production per cow (lb.)*	*Average Butterfat Percentage*	*Days*
1959–60	12,330	6,643	267.0	4.02	276
1960–61	11,825	6,746	270.6	4.01	275
1961–62	11,710	6,768	264.1	3.90	280
1962–63	10,515	6,885	281.6	4.09	280

General

The Dairy Marketing Board had under consideration the building of an extension to the new dairy premises at Gatooma so as to incorporate all activities, including Roquefort cheese manufacture under one roof. At present Roquefort cheese is manufactured at the old dairy premises and apart from increasing operational costs is very inconvenient.

The Dairy Marketing Board were also actively pursuing sales of milk and milk products in the lowveld and planning for the future. The opening of the railway service in this area should assist in overcoming transport problems.

The Dairy Branch has been fortunate in retaining the services of all professional officers including the Senior Dairy Officer from Zambia. Activities of the branch have consequently continued without any serious interruption.

The disposition of the staff was the same as in the previous year with one dairy officer and one milk recorder at Gwelo, one milk recorder at Bulawayo, one milk recorder at Umtali and the remainder of the staff at Salisbury.

Duties of the branch include statutory inspections and registrations of factories and farm dairies, grading and testing of milk and dairy produce, advisory work on production of milk and manufactured products, lecturing at Gwebi and Chibero agricultural colleges, judging dairy produce at agricultural shows and operating the Milk Recording Scheme.

All meetings of the Dairy Marketing Board and its executive committee were attended by the Chief Dairy Officer or his deputy and numerous other meetings of farmers' organizations were attended by officers of the branch.

POULTRY

The outstanding event during the year was the appointment by the Minister of a committee to inquire into the conditions prevailing in the poultry industry. This was engendered by requests from producers because of over-production of poultry products and the consequent low prices which had persisted during 1963 and into 1964.

The committee took evidence from early May and finally published its report in mid-August, 1964.

In view of the comprehensive nature of this report it is not considered necessary to repeat here in detail statistics and other data given in the committee's report.

Poultry Production

The production of all poultry products, eggs, table poultry and day-old chicks has reached a stage of self-sufficiency within the cash economy and can advance further only by increased local consumption or by export.

Increased local consumption will come about as the lower-income groups obtain more spending power or by reducing production costs to meet the rising wage scale at an earlier date. The increase in production is indicated by the fact that imports of poultry products dropped from £36,000 to £1,500 between 1959 and 1963 in the Federal area. Most of the increased production occurred in Rhodesia. In the same period exports rose from £29,000 to £87,000, mostly due to increased sales of day-old chicks and table poultry from Rhodesia. In spite of these increases in exports it is not considered that export markets will expand to any extent with the exception of that for day-old chicks, as most African territories are expanding their production of poultry products but do not have the stock, technical knowledge and resources to produce the chickens required at this stage. It is interesting to note, however, that during the year three of the largest hatcheries here have established branches in Zambia, which will mean lower exports of chickens to that area in future.

It would appear, therefore, that further expansion in production can only be justified when consumption increases in the lower-income groups, mainly African wage earners, though predicted increased prices of red meats will increase consumption of poultry meat generally which is becoming, even if it is not already, the cheapest quality meat available. Much the same applies in respect of egg production and consumption.

Lowered Costs

Producers have lowered costs of production of both eggs and table poultry to a point where only efficient production can survive. This has been done by the use of improved stock, nutrition and management. Whilst there is always room for improved management, the cost of feeding, which is estimated at 69 per cent. of the on-farm costs, is of greatest importance. Within the feed costs the price of maize, which forms 60 per cent. of rations, is by far the most costly item. Lowering the cost of maize in the ration will therefore have the greatest effect on lowering production costs. Under present maize pricing poultry farmers should endeavour, wherever possible, to grow maize (or sorghum in marginal areas), and they are advised accordingly by this branch.

Marketing

Marketing has lagged behind the improvement in stock and management. It is a vital link between producer and consumer where costs can be reduced. The close margin of profit is also having the effect of reducing the number of small producers and increasing the size of flocks of the more efficient producers. The formation of co-operative marketing organizations has been accelerated, particularly in Bulawayo, where a broiler producers' co-operative and an egg producers' co-operative are functioning smoothly.

In Salisbury a private company is organizing the marketing of both eggs and table poultry but has yet to gain wide producer support.

The publication of poultry dressing regulations under the Public Health Act in November, 1963, has been a major step forward in channelling production through centralized marketing organizations. There has been delay in enforcing these regulations as some amendments were desirable which have now been gazetted, and this next year should see a further improvement in formation of strong marketing organizations for table poultry which should reduce costs further. Egg marketing, which does not require the processing necessary for sale, will take longer to become organized, but it is expected that co-operation between the private companies and farmers' co-operatives engaged in egg marketing will stabilize prices to producers to a large extent, but these will be marginal and efficient production will be essential.

Production of poultry products is becoming concentrated near the main centres of consumption to enable transport costs to be minimized. Producers in the rural areas will soon be confined to one or two to serve the small local markets.

Small African and European Producers

The general developments outlined show that poultry production is becoming more specialized, with the exception that maize production, where possible is very desirable. The small producer in rural areas will find it increasingly difficult to compete. This problem

faces both the African and European general farmer: both must be near to a market, grow maize or sorghum and have efficient management. The scope therefore for increased production from African farmers in particular is limited. The subsistence farmer, however, should be encouraged to produce more poultry products for his own use and this policy has been the aim of this branch.

Other Poultry

The quantity of turkeys and ducks produced is confined to a few breeders and producers. The quality of stock has improved. There is no marketing problem with these classes of stock and adequate supplies are available for local requirements with some for export.

Gwebi College

The lectures on poultry to the 1963 intake of students were concentrated into the first three months.

The forty-fourth official Egg Laying Test was terminated on 2nd January, after 44 weeks, to enable the first Random Sample Egg Laying Test to commence on 1st February. This test ended an era of egg-laying tests in Rhodesia of 44 years' duration, in which, each year breeders' pullets have been tested in competition on a selected basis. These have fulfilled useful purposes, enabling breeders to maintain a high standard for pure breeds. Over the years there has been no spectacular improvement in total production, as selected samples have been too small. Costs have been lowered due to improved nutrition. With the advent of hybrid strains, the breeding of which is complex and in most cases established by geneticists overseas, a new type of commercial laying test was necessary. With the random sample test larger samples of 40 pullets are taken at random at day-old from the breeders' incubators, reared together and given identical treatment during the 48 weeks' laying period. The results of this type of test show up the commercial value of the actual type of stock available to the egg producer and also serve to show the breeder how his stock compares with other strains.

Our first Random Sample Egg Laying Test commenced on 1st February, 1964, with two sections, one at Gwebi and the other at Matopos. Results to date have been good and very informative. This test ends on 31st December.

Day-old chicks for the second random sample test were taken from the entrants at the end of August and are at present being reared. This test is popular and insufficient accommodation is available for the entries received.

Building construction during the year comprised the erection of 400 laying cages and the roofing for these. A research brooder house was completed in March.

The killing and dressing premises for student instruction were equipped with new scalding and plucking machinery.

Rerearch and Trials

This work was interrupted by the resignation of the Lecturer in Poultry in November. However, records in connexion with different lighting regimes during rearing on subsequent egg production have, under local conditions, endorsed original work conducted in the U.S.A. and U.K. It was shown that gradually reducing light during the rearing period and stepping it up during the laying period results in earlier egg size attainment and probably higher average egg production. A steady light regime during rearing also has the same effect and will be more suitable to adopt under local conditions.

Towards the end of the year arrangements were made with the University College for Mr. A. J. Smith of that institution to conduct research work at Gwebi and to give lectures to students. He has recently commenced work on calcium metabolism in layers, with pullets reared earlier, whilst further lighting experiments, tests of sorghum as a replacement for maize and metabolizable energy determination of local grains is proposed.

Matopos Research Station

At this station half the pullets in the Random Sample Egg Laying Test are managed in single-bird cages. The results are combined with those from the Gwebi section and one result published.

In October 400 Leghorn pullets were reared in the environmental building on a step-down lighting regime which can best be done in this type of housing. They reared well and are now in laying houses on a production trial with control groups.

In September 600 chicks from a local breeder were obtained and are being reared in the environmental house for the Veterinary Research Department, who will conduct infectious bronchitis transmission tests until June, 1965. It has been decided to concentrate poultry work at Gwebi and the future of the poultry section at Matopos will remain uncertain until the report of the Committee of Inquiry into the Poultry Industry has been considered.

Specialist and Advisory Work

This work was necessarily curtailed owing to staff shortage, but visits were paid to the main centres to obtain evidence for the committee of inquiry, farmers in the main production areas were visited when required, and agricultural shows were attended when judging was requested. All meetings of the Poultry Industry Advisory Committee, the R.N.F.U. and poultry associations were attended.

The Young Farmers' clubs and the Departments of Information and of Conservation and Extension were assisted in preparation of material for advisory work.

Together with the Animal Husbandry Officer at Gwelo, a two-week poultry course was arranged for 24 African farmers from the Mindlands at Mr. D. Gill's farm near Salisbury.

Veterinary

All breeders selling poultry had their stock tested for B.W.D. and fowl typhoid as a compulsory measure by officials of the Veterinary Department. No reactors to B.W.D. were reported.

The incidence of respiratory diseases still remains a main obstacle for broiler producers, causing morbidity, though mortality is low.

In adult poultry the avian leucosis complex is still causing considerable loss. This disease which is world wide is incurable at present.

The Veterinary Department have brought in new regulations covering the importation of stock. These involve quarantine and control by officials of the Department and should prevent the introduction of any new destructive disease in imported birds.

CROP PRODUCTION

Most parts of the country experienced an extremely difficult season for crop production and although, at the time of writing this report, final figures of yields for the 1963–64 season are not available, they are almost certain to be lower than usual. Many areas had rain in the last week or ten days of October but this was followed by a dry November which made planting very difficult. Thus, a lot of planting was delayed until December and, in the case of maize, quite a considerable acreage had to be replanted. In spite of these difficulties the maize crop in most parts of the country looked exceptionally well, and promised a record crop, until the rains ended prematurely in mid-February or very soon afterwards. Many areas had no more rain at all and even the more fortunate had only scattered showers.

The extensive replanting of maize lands which became necessary because of the dry November had a secondary and perhaps more serious repercussion. All except 2,000 pockets of the reserves of hybrid seed held by the Seed Maize Association had to be sold for replanting, and, in consequence, although the Seed Maize Association produced approximately 100,000 pockets of seed this was inadequate to plant the appreciably larger acreage brought about in the main by restrictions on tobacco production. As a result, seed of a quicker maturing hybrid which may prove a disappointment to Rhodesian farmers has had to be

imported from South Africa and, in addition, there has been some planting of "advanced generation" seed taken from last year's crop. This shortage of seed has emphasized the extreme importance of carrying over substantial reserves of seed at all times and the Seed Maize Association are likely to consider this an urgent matter.

In other respects the organization now responsible for the production of parent inbreds and single hybrid seed has functioned well. Just over 50,000 pockets of the single hybrid, SR52, was produced and the extensive acreage planted to this hybrid is likely to have a significant effect on production, given a reasonable favourable season. Seed of two additional inbred lines, which are required for the production of SR14, a double hybrid of similar maturity rating to SR11, was bulked and is available for crossing in the 1964–65 season. Seed of SR14 will be available for commercial planting in 1966–67.

The increased demand for single hybrid seed has resulted in a substantial increase in the value of hybrid seed produced and sold by the Seed Maize Association. This year it rose to over £560,000 and, as mentioned above, would have been greater if more seed had been available. Eighteen thousand eight hundred pockets were sent to Zambia, as compared with 16,400 for the 1963–64 crop. This seed is sold almost entirely to European farmers, and in view of the intention of the Zambian Government to produce its own seed, future exports to that country are problematical.

No crop has made greater progress in the last two or three years than cotton. In spite of the season, a little over 12,500 bales of lint was produced this year compared with 7,130 bales in 1963. The exact acreage planted to produce this record crop is not yet known. Sufficient seed was distributed from Gatooma to plant 18,000 acres but it is estimated that only 11,000 to 12,000 acres were planted because of the difficult planting season. For planting in 1964–65 sufficient seed has been sold for 50,000 acres, which could well give rise to a crop of 40,000 to 50,000 bales, if it is all planted.

There was some expansion in the quantity of wheat produced in the year ending October, 1964. Nearly 17,000 bags (200 lb.) of wheat were delivered for milling at Salisbury, Bulawayo, Gwelo and Umtali and this figure does not take account of wheat sold for seed. There are indications of an increasing interest in wheat, both on the part of individual farmers and of larger concerns. A small acreage of wheat grown in the lowveld yielded 15 bags an acre in spite of late planting, and indicated that yields comparable with those being obtained on the highveld are possible. A few farmers in the Gwelo area remain interested in summer production and it is quite possible that as much as a thousand acres will be sown in 1964–65. These farmers in the marginal rainfall areas believe that wheat can stand dry weather in the latter part of the growing season better than maize and that with mechnization it may be as profitable a crop to grow.

Deliveries to the Grain Marketing Board of groundnuts totalled approximately 28,000 tons of shelled kernels. It is believed that a little expansion in groundnut production is taking place on European farms but the best bulk of this production comes from African areas. Attempts are being made to standardize the types and colour of nuts grown by Africans as it is thought that pink nuts are more acceptable to the market.

There are no real indications yet that soya bean production is on the increase. Whilst extensive markets are available, both in the United Kingdom and Japan, the yields obtained and the price offered do not combine to make soya beans an attractive proposition by comparison with maize and cotton. If sales of inoculants are any indication of the acreage to be planted in the 1964–65 season no substantial increase in the acreage planted is likely. The Ministry attach great importance to the breeding of suitable, high-yielding varieties for Rhodesian conditions and, if possible, this programme will be expedited by growing two generations a year.

No significant changes in the production of other crops can be reported but the production of sugar in the lowveld has been mainly responsible for the phenomenal development which has occurred in that part of Rhodesia. It is hoped that recent arrangements for the

narketing of the crop will make further expansion possible but, in all probability, farmers in hose areas will in future diversify their cropping to a much greater extent.

PASTURE RESEARCH AND ECOLOGY

Veld Grazing

The importance of the beef industry in the economy of Rhodesia needs no emphasis. It is estimated that in Rhodesia only about 6 per cent. of the land area is under cultivation or fallow, while the remainder is natural grazing or veld. Because of climate and topography by far the greater part of this veld is unsuitable for cropping and can only be used as natural grazing. It is the basis on which our beef industry is built and its importance as a natural resource, to be preserved and exploited on a sustained yield basis, is very great indeed. Its condition, whether deteriorating or improving, should be a matter of concern to all of us.

It has been estimated that there are in the region of 10 million acres of severly over-grazed veld in the African areas of Matabeleland, mainly in the south, which have been denuded of perennial grass for so long now that merely resting from grazing, or even completely destocking, would not be the quickest method of reclamation, and research into re-seeding and mechnical treatments such as ripping are needed.

While the condition of the veld is most serious in southern Matabeleland, assessments made on *potential* not *actual* carrying capacity and adjusted to include all animals carried, show that over the country as a whole 18·4 million acres or 73 per cent. of the available tribal grazing is overstocked. In actual fact the position is much worse than this and the degree of overstocking much greater than is shown by the assessment figures, because the potential carrying capacity is a theoretical ideal which can only be reached when the condition of the grazing has been improved by bush clearing and sound management.

In short, it can be said that except for areas protected by tsetse fly or by distance from watering points, practically all Tribal Trust grazing land is overstocked, that much of it is damaged and that the amount of damage evidenced by loss of perennial cover, bush encroachment, denudation and erosion is increasing year by year.

It has been shown by work at Matopos, Nyamandhlovu and Grasslands that individual animal gains increase as the stocking rate is reduced, while return per acre increases as the stocking rate is increased; smaller gains from more animals giving a greater return per unit area than larger gains from fewer.

This is true only until forage production is reduced by deterioration in the grass cover caused by overgrazing. Deterioration of the grass cover proceeds at an increasing rate and eventually, as the level of forage production begins to fall steeply, a cracking point is reached at which animal production falls too. Over much of the tribal area the "cracking point" has already been reached and although the corresponding fall in cattle production is still being masked by various means of relieving pressure and of making new grazing available, the end result is plain and cannot be postponed indefinitely—overstocking and poor management together lead to reduced forage production and must eventually give rise to a catastrophic drop in the amount of beef produced from the Tribal Trust Land.

In the European Area, because the pressure of grazing animals is not so severe (many European properties are understocked) and because management is on the whole much better, the situation is not nearly as alarming, but evidence of deterioration is not lacking. Bush encroachment in grazing land is proceeding at an alarming rate and especially in the drier areas. Destruction of the grass cover by overgrazing and poor management, with resultant denudation and erosion, is very evident and in some areas and on some properties has reached a stage comparable with that of much tribal land.

A beef industry based on veld grazing can only be sound if sustained production can be ensured by sound management practices, which include reduction of the stocking rate to what the vegetation can stand, prevention of bush encroachment and the control of harvester termites. As yet very little is being done on these lines and despite evidence of widespread

deterioration in both African and European areas very little attention is paid to this threat to the developing industry, while increased production of beef in a deteriorating environment is encouraged by all available means.

Sample Survey of Grazing Land

Because it is considered to be urgently necessary to investigate the trend in veld production in critical areas so that steps can be taken in time, plans have been drawn up for the carrying out of a sample survey of grazing land in both farming areas and the Tribal Trust Land falling within natural regions 3, 4 and 5. The objective is to measure and record veld condition in selected veld types in order to determine whether or not the veld is deteriorating with the use imposed and to demonstrate to the farmer or tribesman accordingly.

Investigation of Conditions of Grazing in Tribal Trust Land

In order to obtain an immediate appreciation of the condition of grazing in Tribal Trust Land (as described in Rhodesia Government Notice No. 518 of 1963) a grazing classification is being compiled. This is based on four condition classes with appropriate recording of natural region and relevant biotic factors. The estimation of condition is being made by experienced officers of the branch.

Harvester Termites

Damage to veld caused by harvester termites appears to be increasing, especially in natural regions 3, 4 and 5, where now it is very important.

It is suspected that over much of the drier country the population of harvester termites is approaching the saturation point and that in these areas the damage attributable to overgrazing is due as much to the depradations of harvester termites as to cattle. In addition to consuming much or all of the available forage, harvester termites encourage bush encroachment.

Research is urgently needed to establish the present position, into methods of control and into the effect of grazing management practices and stocking rate on harvester termite populations.

Bush Eradication and Control

Ringbarking.

Very interesting and important results have been obtained from a ringbarking trial in *Brachystegia-Julbernardia* woodland on the Makoholi Research Station. These show that over a four-year period the average yield of grass after ringbarking was more than four times as much as the yield from the contiguous woodland area.

In a wet year with above-average rainfall the yield from both woodland and ringbarked areas was highest with the woodland area yield one-third of the ringbarked area yield.

The following year with approximately half the rainfall the yield from the ringbarked area dropped slightly but the yield from the woodland area dropped to one-quarter. In this dry year the yield from the ringbarked area was of the order of eleven times that of the woodland area.

Goats.

At Matopos and at Tuli very spectacular results in bush control are being obtained from the use of goats in combination with cattle.

At Tuli, *Commiphora* spp., *Grewia* spp. and other trees and shrubs are killed by the goats, while at Matopos the goats are able to prevent regeneration in mixed thornveld.

At the correct stocking rate in comparatively small paddocks goats are very effective in controlling bush, and by their use in place of fire a much more complete utilization of the available forage can be obtained, with a corresponding increase in the production per acre in terms of meat.

Problems which remain are concerned with the management and effective use of goats in large paddocks. If these can be solved, there is no doubt a major breakthrough leading

to a great increase in the production from a number of veld types will have been achieved. On the other hand in *Brachystegia-Julbernardia* woodland at Battlefields and at Makoholi results with goats have been disappointing.

Senecio Survey

The two most important poisonous plants in Southern Rhodesia are *Senecio sceleratus* in the Eastern Districts and *Dichapetalum cymosum* in the north-west and western areas.

A survey of the *Senecio* problem in the Eastern Districts has been commenced. Initial study involved a review of the literature and subsequently visits have been made to eight farms to examine the problem and to study ecological and management factors. This work continues and a report is to be published during the coming year.

The Research Stations

Matopos

The pasture staff are engaged in assembling the data on veld management and ecological work in Matabeleland since 1945, which is to be published soon.

The grazing trials were severely affected by the drought experienced during the 1963-64 season.

In the seasonal grazing trials considerable differences in species composition now exist between treatments.

In veld fertilizer experiments in which various amounts of nitrogen and phosphorus are applied to veld in summer and the grass harvested at intervals during the dry season were continued for the third year running, but this year the drought caused a reversal of previous results in that dry-matter yields from the thornveld were appreciably lower than from the sandveld. As in previous years, yields increased as the amount of nitrogen applied increased and responses to phosphorus were more erratic and were generally small.

Nyamandhlovu

Work has been curtailed by the reduction in staff.

In stocking rate trials steer weight changes and botanical observations have shown that when overall stocking rates are greater than one animal to 15 acres in a four-camp, three-herd system of management on the sensitive red soil veld, both veld and animals are seriously affected.

In ecological trials in the dense "gusu" fringe woodland, the plots cleared of bush yielded 116 per cent. more than the uncleared plots. Excavation of the root systems of seven tree species growing in the same community revealed considerable differences between some species. Tap roots were common and the lateral spread of roots was usually twice to three times the height of the tree and mostly on the southern side.

The preliminary results from a basal stem spray trial on short *Acacia nilotica* suggest that the species is more susceptible to oils and herbicide mixtures applied during October than during January.

Ringbarking has proved very effective on well-grown trees of *Acacia nilotica* and, when combined with October fires and the later plucking of coppice, shows signs of being effective on all but a few of the woody species growing on red and black soil.

Tuli

The severest drought for many years was experienced this year.

In the veld management trials, the year should have been an excellent one for comparing the performance of cattle on cleared and bushed veld, but unfortunately harvester termites have invaded the cleared experiments so seriously that it was apparent early in the dry season that if control measures were not taken, no grass at all would remain. The paddocks were, therefore, destocked in July and sprayed with a dieldrin compound. Although it is obvious that this has reduced the termite population very consideraly, observations are still being carried out to determine to what extent (if any) colonies have escaped the poison. During 1963 the same paddocks were baited with chopped grass poisoned with sodium fluosilicate, but the results were disappointing.

Although a full year's comparison of cattle performance on cleared and uncleared veld was not possible, the data in the following table are of interest:

		Average weight per steer (lb.)		Average
	rate	26/9/63	25/6/64	gain/head
Bushed veld ...	1:15	484.3	622.8	138.5
	1:20	490.7	637.0	146.3
	1:25	491.2	735.8	244.6
	1:30	522.5	842.7	320.2
Cleared veld ...	1:7½	490.7	778.0	287.3
	1:10	522.2	860.0	337.8
	1:15	491.0	793.7	302.7
	1:20	493.2	833.3	340.1

The animals used in these trials were nine months old in September, 1963. The table illustrates the great advantage obtained from clearing bush.

In the goat trials, greater than normal control of woody species is being obtained this year and much of the scrub mopane and *Grewia* spp. are being killed to ground level as the goats strip all accessible bark.

In tree root studies, work on the excavation and measurement of tree roots continues and some interesting inter-species comparisons are being obtained.

GRASSLANDS

The screening of grasses, with emphasis on their ability to withstand intensive grazing and cutting without loss of vigour, has been continued. Some 140 grasses have been planted to date. The first selections from this programme, Muguga Star grass (*Cynodon* sp.), Beehive Paspalum (*Paspalum plicatulum*) and Wintergreen Paspalum (*P. guenoarum*) were established in small plot trials for critical comparison with various frequency-of-cutting treatments and levels of fertilizing with nitrogen. Planting material of Maguga Star grass and seed and planting material of the *Paspalum* spp. has been released to farmers and to the Rhodesian Pasture Seed Growers' Association.

The search for high-yielding stoloniferous and rhizomatous grasses for use as permanent and semi-permanent pasture has been continued and *Paspalum notatum*, the highest yielding grass in a previous trial, is being compared with five new grasses in an experiment to compare production when the grasses are grown alone or with *Trifolium semipilosum* or *Lotononis bainesii* and at various levels of fertilizing with nitrogen.

Attempts to prevent the "running out" of *Sabi Panicum* by root pruning have not been successful. The roots were pruned in 1952-53 and the immediate effect was to reduce yields. Pruning had no residual effect in the current season. In the same experiment heavy applications of compost at the rate of 60 tons dry compost per acre three years ago had had striking effects on yield every season. In this the third season, yields were increased two-fold as compared with the plots which did not receive compost. The rate of response to nitrolime was similar whether or not compost was applied.

Much emphasis is now being placed on work with legumes. During the year a great deal of progress has been made in the study of the nodulation of indigenous legumes and a most useful list of "Legumes Indigenous to and Naturalized in Rhodesia" has been prepared by R. B. Drummond and H. D. L. Corby.

During the past four years some 120 pasture and forage legumes have been screened for adaption to the local environment. The following species have shown up well and are worthy of further study:

Lotononis bainesii.
Trifolium semipilosum.
Stylosanthes guayanensis.
S. Mucronata.
Dolichos formosus.
D. discolor.
Medicago sative.
Listia heterophylla.

Current work is concerned with the resistance of these species to attack by root-knot eelworm and the selection of eelworm-resistant strains, their fertilizer requirements for good

growth on sandveld, and their ability to withstand intensive cutting and grazing without loss of vigour.

A new stocking-rate trial on veld was started in the 1963-64 season, the rates being 3¾, 5 and 6¼ acres per steer for the period December to May inclusive. In this, the first season, the steers grazing at the lightest rate gained 25 lb. more than the steers in the other two groups.

Mattocking trials with Msasa and Mnondo coppice show that these species will withstand mattocking as frequently as three times a season for three consecutive seasons with only slight loss of vigour.

In a preliminary trial the new arboricide Tordon was applied as a spray at different concentrations to Msasa and Mnondo coppice. Virtually all top growth was killed but some of the trees have coppiced again from ground level.

HENDERSON RESEARCH STATION

The station continued with studies of forage flow sequences for beef breeding cows, weaners and fattening cattle.

Aberdeen Angus weaners, overwintered at maintenance level and then summer grazed on sown pastures, gained 192 lb. per head in a 146-day period, at a grazing pressure of 243 grazing days per acre. The sown pastures grazed by these animals consisted of 2 acres each of Giant Rhodes grass, *Panicum repens* and *Beckeropsis uniseta*.

Summer milk production

Studies of the seasonal production of milk continued until the end of May, 1964, when the Friesland herd was transferred to the small-scale intensive farm units. The average milk production over a 222-day lactation, starting in October and finishing at the end of May, was 4,445 lb. per cow or 2 gallons per day. All animals received a supplement of 5lb. corn and cob meal during their lactation and were grazed on vleis and planted pastures during this period. They were also allowed legume grazing on a supplementary basis. During the summer grazing season the cows were on vleis for 85 days and sown pastures for 137 days, the vlei grazing being used at the beginning and the end of the grazing season. All animals gained satisfactorily through the summer and at the end of March, when the bull was removed, 90 per cent. of the cows were in calf.

These are comparable with previous yields.

Work continued with two perennial pasture legumes *Desmodium discolor* and *Desmodium intortum*. Establishment under cover crops of maize was unsuccessful due to poor rainfall after planting.

Attempts to establish *Desmodium discolor* in veld were largely unsuccessful but further attempts are to be made during the coming season. Results of experiments continue to show that *Desmodium discolor* is unable to maintain its vigour when more than one silage cut is taken in a season and it is then autumn grazed. Continuous grazing throughout the growing season also appears to affect vigour if it is not allowed to grow out well first.

Desmodium intortum was used to provide supplementary grazing for dairy cows and no ill effects have been detected from their heavy utilization; they are able to remain weed free and vigorous even under relatively dry conditions.

Investigations into the effects of various stocking rates and burning frequencies on veld used for winter grazing continues. No differences have been detected in animal production between grazing pressures of 24, 36 and 48 grazing days per acre. Burning treatments, although still at an early stage, are beginning to show differences. The annual burn appears to be controlling coppice regrowth satisfactorily, whereas in the case of the three-year burn some of the coppice is becoming too big to be effectively controlled by fire.

Results from an experiment comparing Giant Rhodes grass and *Hyparrhenia* veld under various cutting frequencies and fertilizer levels show that while the dry matter production of both swards was increased by the addition of nitrogen, there was no difference in response between grasses.

Nitrogen recovery figures show that slightly more nitrogen was recovered from the Giant Rhodes grass than the veld plots and that the plots cut every fortnight yielded about three times as much nitrogen as those cut only once per season. This experiment will be continued for one more season.

MELSETTER

Work has been carried out by the Technical Assistant under the guidance of Grasslands Research Station.

A botanical survey of the burning and protection experiments has recently been completed and an account of the results obtained is being prepared for publication.

Until recently it was generally believed that while Kikuyu grass produced viable seed at Inyanga, the type grown at Melsetter was sterile. During the year it was shown that this belief was completely unfounded and Kikuyu at Melsetter produced large quantities of viable seed. This discovery has two implications, it reveals a formerly unrecognized danger to horticulture and to seed potato growing but, on the other hand, the free seeding habit of the local strain will prove useful in the projected hill-grassland improvement programme.

MAKOHOLI

Very interesting results have been obtained from a ringbarking trial. These results have recently been published and are summarized elsewhere in this report.

MASERA

The results obtained in the stocking rate trial are being written up for publication.

Pasture Grass Seed

The drought experienced during the 1963-64 season had a serious effect on the production of grass seed and for the first time since 1954-55 the steady increase in seed production recorded each season has been interrupted. This drop in production is shown below:

Season	*Katambora Rhodes Grass*	*Giant Rhodes Grass*	*Ermelo Weeping Love Grass*	*Sabi Panicum*	***Total***
1962-63	75,777 lb.	32,186 lb.	21,248 lb.	13,128 lb.	142,339 lb.
1963-64	29,098 lb.	10,174 lb.	20,487 lb.	8,623 lb.	78,382 lb.

The table includes all seed, both certified and uncertified, sold by the Salisbury Farmers' Co-op., who are the official agents to the Rhodesia Pasture Seed Growers' Association. A remarkable feature is that the 20,487 lb. of seed of Ermelo Weeping Love Grass was all grown in Rhodesia. Usually a considerable amount of the seed of this grass is imported from the Republic of South Africa.

General

CONFERENCES

The fifth Pasture Officers' Conference was held this year at Matopos Research Station. At this very successful conference the mornings were spent in touring the veld management experiments while the afternoons were devoted to paper reading and discussion.

The ninth ordinary meeting of S.A.R.C.C.U.S. was held in Durban from June 2nd to the 12th. At this conference the Chief Pasture Research Officer presented a report on pasture management and improvement in Rhodesia, as well as the progress report of the Standing Subcommittee on Bush Control.

The delegates to S.A.R.C.C.U.S. toured most of Natal as guests of the South African Government, visiting research stations and seeing much of the agricultural development that is taking place. This was a most valuable experience.

TRAINING AND CO-OPERATION

Assistance was given to the Training Branch of the Department of Conservation and Extension in organizing, supervising and lecturing at two courses in veld and pasture management during May.

In addition lectures on vegetation were given at three farm planning courses.

Lectures on bush control and veld management were delivered at meetings of the Umzingwane group of I.C.A.s, Inyati I.C.A. and Que Que group of I.C.A.s. Lectures on pastures were given to the Inyanga I.C.A., to the Bromley Farmers' Association and as a broadcast talk in the .R.B. programme.

Advisory visits in company with Conex officers were made to Inyanga, Gwanda (Maluti Farm), Inyati, Ayrshire North, Umtali North, Que Que, Somabula, Charter Estates, Macheke (Mere Estate), Fort Rixon, Sengwe T.T.L., Bakasa T.T.L., Chipise T.T.L., Diti T.T.L., Mtetengwe T.T.L., Marimani T.T.L., Masera T.T.L. and Machuchuta T.T.L.

In the Nuanetsi I.C.A. suitable sites for veld-burning experiments were selected on the Nuanetsi Ranch, the burning experiment on Buffalo Range Ranch was inspected and Samba Ranch visited.

The Chief Pasture Research Officer was a member of the Urungwe Non-Hunting Area survey team which operated in the Zambezi Valley from 21st to 31st October, 1963. He visited Zambia to attend a seminar to which he was invited at the A.R.C. Laboratory at Mount Makulu, in September, 1964.

Regular visits have been paid to the research stations and numerous committee meetings have been attended.

Progress is being made in ecological surveys of particular areas and vegetation types.

Publications

"Pasture Management and Improvement", for the ninth ordinary meeting of S.A.R.C.C.U.S., by O. West (to be published in *Rhod. Agric. Jnl.*).

"Progress Report of the Standing Subcommittee on Bush Control", to the ninth ordinary meeting of S.A.R.C.C.U.S., by O. West (to be published in *African Soils*).

"Principles of Range Management and the Factors affecting the Carrying Capacity of Veld Grazing", by O. West. Published in *Wild Life Conservation Training Course*, N.R.B., Salisbury.

"The Seeding of *Pennisetum clandestinum* in the Melsetter District of Southern Rhodesia" by O. West. (To be published.)

"Fire in Vegetation and its use in Pasture Management with Special Reference to Tropical and Subtropical Africa", by O. West. Completed for the Commonwealth Bureau of Pastures and Field Crops. (To be published.)

"The Effects of Ringbarking Trees in *Brachystegia* Woodland on the Yield of Veld Grasses". Published in *Rhod. Agric. Jnl.*, September-October, 1964, by H. K. Ward and W. B. Cleghorn.

"The Senecio Problem in Southern Rhodesia, Part I. A Review of the Problem." Paper presented at a Pasture Conference at Matopos Research Station in April, 1964, by W. B. Cleghorn.

Papers published by other members of the Pasture Branch are listed in the reports from the stations.

HORTICULTURE

Considerable expansion of the horticultural industry occurred, particularly in fruit production. More deciduous fruit trees were established, principally in the Eastern Highlands and extensive planting of orange trees was continued at Mazoe. This is aimed at a greater measure of self-sufficiency and increased exportation. There was more interest taken in air-exportation of produce to British markets.

A hot, dry autumn was followed by an exceptionally severe and prolonged period of frost, with temperatures as low as 18° F. recorded.

These conditions had mixed effects on fruit and vegetables. Peach and plum crops benefited considerably, they were early, with the fruit being of high quality. Grapes were much less troubled by fungus diseases, but considerable damage was done to citrus and subtropical fruit trees in all areas. The drier summer was more favourable for summer vegetables but depleted water supplies curtailed production. Hail damaged apples at Melsetter.

Fruit

Deciduous

With the good demand for fresh fruits and farmers looking for alternative crops t tobacco, many new commercial plantings of all kinds of deciduous fruit trees were mad The main emphasis was on an extended production of desert peaches, apples and tab grapes.

Fruit crops were good, with peaches being of the highest quality and most attractive appearance. Air-exports to the London markets realized good prices and were valued almost £500. Grading, packing, presentation and orchard management were all much im proved.

Grape growing has steadily increased, particularly among plotholders, in the produ tion of table grapes. The new plantings, covering a wide range of varieties, were made i many parts of the country. Earlier plantings show considerable promise where good cu tural management has been given.

The collective returns of fresh fruit imports for 1963 (which were still on a Federa basis), show that a steady increase in such importation of all kinds of deciduous fruits toc place and these returns illustrate the scope that still exists for much greater self-sufficiency.

Citrus

Cropping increased and there was more late fruit and out-of-season production, makin oranges available throughout the year. Due to climatic conditions fruit size was reduce especially with oranges from older trees, and consequently there was an enhanced dema for the larger fruits.

With a shortfall of grapefruit for canning it was necessary to allow restricted importa tion of supplies from Moçambique and import control of naartjies was imposed for almo two months.

Exports were largely of grapefruit, lemons and Valencia Late oranges from Hipp Valley, and oranges from the Beitbridge area. For the nine-month period of 1964, orang exports amounted to 1,399 tons, valued at £35,819. Grapefruit, lemons and a few naartjie totalling 822 tons and valued at £23,475, were also exported.

Fruit juice (citrus) exports increased from £100,661 to £166,153 in value.

Subtropical Fruit

There was a small increase in banana plantings and the value of fruit sold in 196 reached £10,000. This still represents only a small percentage of Rhodesia's Cavendis banana requirements, the balance being imported from Moçambique. Much the same applie to avocados, pawpaws, pineapples and litchis.

The main problem with banana production is the lack of suitable land not subject t frost and within easy reach of rail. With the branch rail line having been extended t Chiredzi the lowveld could readily produce the country's requirements of bananas and othe sub-tropical fruits in due course.

With the success of trial air-exports of avocados to Covent Garden market last yea consignments were increased with success; the variety Fuerte was most in demand. Trial lo of mangoes were similarly exported with fair results and the total exports of these fruits wa valued at £2,106.

Vegetables

The record total of 5,330 acres of fresh vegetables was an increase of 210 acres over th previous year. Summer production was favoured by the drier weather and generally vege tables were plentiful, reducing the need to import from South Africa.

Onions

Onion acreage increased to 320 and gave a yield of 25,600 bags (120 lb.). With smaller demand for the stored crop from the northern territories, marketing was much mor difficult with prices far lower than usual.

Growers are gradually taking more interest in early season cropping by the use of the brid variety Dessex, a variety which gives good yields and ripens early when prices are gh. A move was made by the processors to get pickling onions grown locally.

USHROOMS

A successful effort was made to encourage the production of mushrooms and so reduce nports. An experienced grower in the Umtali District has installed a canning plant and is so producing spawn.

ANS

A new departure was the export by air of green beans to London during the season ctober to April. These reached a total value of £6,877.

Special Crops

OFFEE

Coffee was subjected to severe drought and the most prolonged period of low temeratures recorded for many years but escaped serious damage.

It was demonstrated that mulch increased cold damage and it is now recommended that ulch be removed from the immediate vicinity of young seedlings during the frost period.

As a side effect of low temperatures, a *Cercospora* infection become epidemic throughut the Eastern Highlands in differing degrees of severity. In the Vumba and the upper onde Valley the attack was acute but in the Chipinga area damage, although widespread, as more superficial.

Throughout the season drought strain has been steadily increasing. Many water sources ave dried out completely to the detriment of coffee nurseries and by August mature coffee the vicinity of any large shade tree such as *Grevillia Robusta* was wilting severely.

In the Shamva area planters are interested in the possibility of growing coffee under rigation. Several plantings of coffee were examined, but with one exception all had been eglected. The exception was a small plot of mature coffee, under shade, in excellent conition and carrying a heavy crop of surprisingly good quality cherry. In the Bikita area ere are isolated pockets of deep soil considered suitable for coffee and two small test lots are being established.

Numerous demonstrations have been given, from the nursery stage through establishent to the mature stage of coffee growing and processing; in addition normal advisory ervices have been provided.

With new acreages coming into bearing, coffee pulperies were erected and brought into peration during the season on four estates. The coffee mill in Umtali has now been rected and is in operation. The present crop being milled amounts to approximately 50 ons clean coffee. The hulling is excellent, but the grading is not yet satisfactory and alterations nd improvements will be required for next season. Good-quality parcels of coffee have assed through the mill but unfortunately the largest single consignment of nearly 30 tons ncluded a very high proportion of "elephants" and the present screens are not separating he "ears" from the A's and Pea-berry grades.

The proposed acreage by registered coffee growers in 1964-65 amounts to 1,086 and this oes not include the acreages planned by growers as yet unregistered. The scheme for settling n farmers in the Chipinga and Melsetter areas may increase the coffee acreage in these reas by 250 acres in each of the next two years.

Considering all the risks of importing Coffee Berry Disease from East Africa, it is elt that there are a sufficient number of their best selections already established to allow election of mother trees specifically suited to Rhodesian soil and climatic conditions.

Samples of cherry picked from all promising areas in the Eastern Highlands were, fter a year's storage, examined for "keeping quality". The results show clearly that the imate and soils of the Eastern Highlands are suitable to the production of high-grade rabica coffee and that it is possible to obtain extremely high percentage of the better rades of coffee and that the "keeping qualities" of many of these coffees are excellent.

World market reports indicate that in the raw, the coffee is bold and of attract appearance; in the roast, there are very few pales or inferiors and that the character is w above average, but the taste, as yet, does not live up to the promise of the excellent r and roast appearance. At present the taste can only be judged as equal to a fair or gc Kenya as it is lacking in body and acidity. The samples tested were all taken from you trees so it is confidently expected that an improvement in the liquor will bring Rhodes coffee into the category of a fine quality.

TEA

During the year the tea acreage increased by 350 to a total of 5,990 acres, of which 4,5 acres were productive. The total crop reaped was 2,697,000 lb. Exports for the period Janua to July, 1964, were valued at £128,414.

Tea production is confined to the areas of high rainfall in the Eastern Highlands a there are prospects of expansion.

ESSENTIAL OILS

Exports are at present still confined to citrus essential oils. For 1963 these were valu at £33,782 and are expected to increase with more citrus fruit being processed.

Interest was maintained in trial production of rose-scented geranium (*Pelargoniu graveolens*) and more small-scale commercial plantings were established, but so far on sample lots of oil have been expressed for tests.

CUT FLOWERS

Following a successful start last season, the production of gladioli for cut flowers a corms was increased, especially for air-export to the London markets. Exports of blooms f the year were valued at £6,761 and were of an extremely high standard and now attemp are being made to enter other European markets.

All-year-round chrystanthemum growing in plastic greenhouses increased in the Salisbu area to meet local market demands and there was some commercial production of carnatio and roses.

A flower growers' association was formed whose main interest is the expansion of a exportation of flowers to Europe.

Pests and Diseases

Resulting from the drier season, red scale of citrus and mite on tomatoes were mc serious than usual. Fruit sucking moth damage of deciduous fruits and grapes was less th for some years.

Fungus disease outbreaks were also much less serious than usual during the rainy seasc particularly late blight of tomatoes and potatoes. Some outbreaks of tomato bacterial cank occurred. Apple and peach mildew were common.

With erratic rains some crops of potatoes suffered from drought which caused interr browning of the tubers. Trace element deficiencies of zinc and manganese were common both subtropical and deciduous fruit trees, but such trees responded to spray applications a grape vines have much improved by topdressing with magnesium sulphate.

Research and Investigational Work

Within the branch of horticulture, research on deciduous and soft fruit is carried o at the Rhodes Inyanga Orchards Station, some vegetable and geranium for oil investigatio are conducted at Henderson Research Station and coffee research is centred at Chipin Experiment Station. This work is reported separately in the stations' reports.

Difficulty encountered with pears of the Keiffer variety not ripening properly w corrected by boron applications. In spite of lower winter temperatures, the benefits obtain by spraying apple trees with D.N.O.C. oil sprays were still very considerable.

Of the five Kenya varieties of pyrethrum under trial, the M41 grew best and flower most freely. It was necessary to irrigate plants every two to three weeks in spring and ear summer to avoid wilting.

A horticultural survey of the orchards of the Eastern Districts was completed to provide ormation necessary to investigate the fruit-processing industry and its possible expansion. e special investigation of the London markets for the prospects of air-freighting of fruit, wers and vegetables from Rhodesia was of considerable value and, as a result of which, ports of high-quality produce have increased.

Marketing

With increased production and higher quality standards, together with a better continuity supply, marketing problems were much reduced.

The growers' deciduous fruit pool organization for marketing fruit was disbanded and oducers now arrange their own outlets by direct contacts or by sales through auction rkets at Salisbury and Bulawayo.

Apples sold readily at more reasonable prices. The marketing of plums as fresh fruit s much improved due to a large quantity of the less popular variety Methley being verted to the Umtali factory for processing. With the total ban on imports of citrus fruit m Moçambique, there was a considerable improvement in regulated marketing of citrus.

Processing

While the processing industry made progress, the scale of operations is still very small relation to the home market and export potential. Efforts are being made to extend the nning of fruit and vegetables in other areas. Since the appointment of a horticulturist as field liaison officer at the Umtali factory the continuity of production has improved.

To obtain larger supplies of deciduous fruits for both canning and jam, an increased ice is now being offered to growers. Larger quantities of grapefruit were canned and ntracts for vegetable crops were readily taken up by growers.

Staff and Services

The staff position in the Horticultural Branch was not affected by the dissolution of e Federation. The stationing of an advisory horticulturist in Bulawayo has been of nsiderable benefit to Matabeleland, Midlands and Fort Victoria. The Chipinga Experiment ation for coffee research was taken into the branch and a horticulturist put in charge. The nior Horticultural Officer, Umtali, made a study tour of the Transvaal to study extension id research services.

Increased demands for all forms of horticultural services throughout the country illustrate e expanded role of the industry. The horticultural staff in each province gave a series of urses on fruit and vegetables for Conservation and Extension field staff.

BOTANY, PLANT PATHOLOGY AND SEED SERVICES

INTRODUCTION

There were a number of important changes in the staff position during the year, prin-pally resulting from the transfer of Dr. G. R. Bates to the Public Services Board in ugust, 1963.

Dr. J. O. Whiteside was transferred from the Umtali Regional Laboratory on 1st January, 964, and he then took up the appointment of Senior Plant Pathologist in Salisbury. It is oped to reopen within the next year. The Plant Pathology Section was brought to full rength following the appointment of Messrs. R. A. Bailey and R. S. Stephenson.

During the year the Seed Section lost Mr. W. E. Kerr and Mr. J. R. Humphreys, but ined Mr. R. J. Gaiger, who joined the staff in April, 1964. One post of seeds officer still mains vacant and Mr. K. B. Hanssen was appointed Acting Officer-in-Charge of the section.

In September, 1964, Dr. Wild visited Luanda in order to work on the proposed *Flora ambesiaca* vegetation map with Professor L. A. Grandvaux Barbosa of the University of uanda.

Mr. G. W. Herd visited the Stellenbosch Elsenburg College of Agriculture in order to arn something of the work being carried out in South Africa on stem rust of wheat and discuss maters of mutual interest concerning this disease with Professor F. X. Laubscher.

Officers of the Seed Services Section have provided lectures on seed testing, producti and certification to the University College of Rhodesia and Nyasaland, Gwebi College Agriculture, the Conservation and Extension Department and farmers' associations.

BOTANY

Herbarium

The old Herbarium building was vacated on 1st and 2nd October and the Herbariu transferred to the new building in the Botanic Garden, Alexandra Park, where it is n well established. The usefulness of having the Herbarium situated in the Botanic Gard is already abundantly apparent.

The total number of accessions for the year was 11,332 (compared with 9,050 a 9,451 for the two preceding years). This total included 3,709 plants named from Southe Rhodesian sources, mainly for other Government departments, 3,407 named from Northe Rhodesian sources, again almost entirely for members of Government departments, and 8 from Malawi and Bechuanaland Protectorate.

Material was also named for the Forestry Commission of Southern Rhodesia; F.A. Ecologist, Kafue Basin Survey; National Museums of Southern Rhodesia; Rhodes-Livingsto Museum; botany, zoology, chemistry and agriculture departments of the University Colle of Rhodesia and Nyasaland; the Tobacco Research Board; Natural Resources Board a the Agricultural Research Council.

Important collections were made in a wide variety of localities in Southern Rhodes The places visited included the Mavuradona Mountains, Darwendale, Selukwe, West Nich son, Vumba, Bindura, Chinamora Reserve, Wedza Mountain, Chiswiti and Kandaya reserv Gwaai Valley, Wankie, Nyamandhlovu, Fort Rixon and Chatsworth. The peculiar flora the Serpentines of the Great Dyke received special attention.

Two thousand eight hundred named duplicate herbarium specimens were received fro other herbaria, the most important of which were Royal Botanic Gardens, Kew; Jard Botanique de L'Etat, Brussels; National Herbarium, Pretoria; Wageningen, Nairobi; Briti Museum (Natural History); Sa da Bandeira and Nova Lisboa.

Three thousand two hundred and fifty-six named duplicate specimens were distribut in exchange to the herbaria mentioned above and also to Lisboa Munich and Missou Botanic Garden.

The Christian Herbarium of 377 sheets of cycads and aloes has been transferred fro Ewanrigg to the Government Herbarium, Salisbury. It is an invaluable collection rich type specimens. The addition of this material makes our aloe collection one of the be in the world.

Flora Zambesiaca

Galley proofs of the greater part of volume 2, part 2, of the *Flora Zambesiaca* ha now been corrected and this part should be published in early 1965. Volume 3 of the *Flo Zambesiaca* which follows is to be devoted entirely to the *Leguminosae* and work on th volume is well under way at the Royal Botanic Gardens, Kew. The first part of the gra volume being prepared by Dr. Launert of the British Museum (Natural History) is expect to be ready for the press by the end of 1965.

Dr. Wild is still at work on the *compositae* volume of the flora which will not appe for some years yet. He has however published a revision of the composite genus *Anis pappus* in volume 4 of *Kirkia* and has in the press revisions of the genera *Aspilia* an *Melanthera* which will appear in volume 5 of *Kirkia.*

Mr. R. B. Drummond is beginning work on the *Rubiaceae* for the *Flora Zambesiac*

Phytogeographical Research

Dr. Wild has now completed his studies of the endemic species of the Chimanima Mountains and has published an account of their significance in *Kirkia,* volume 4. He has al carried out an intensive survey of the vegetation of the Great Dyke with particular referen

o the Serpentine flora. A check list of species have been produced together with a dis-ussion on the various problems of phytogeographical significance involved. This article is iow in the press and will appear in the next volume of *Kirkia*. Work of this type may ;radually develop significance in relation to prospecting for metallic ores.

Library

The Herbarium library has continued to grow, especially in the acquisition of micro-iche copies of botanical literature. In addition some 43 volumes and about 150 reprints were presented to the Herbarium library by the Director of the Royal Botanic Gardens, Kew. The taxonomic reprint collection has been completely rearranged during the last year and is now much easier to consult.

Kirkia

Volume 4 of *Kirkia* was published in August, 1964, and material for volume 5, part 1, which should appear about the end of this year, has already gone to press.

Economic Botany

Weeds

Research on the physiology of *Salvinia* is continuing at the University College of Rhodesia and Nyasaland, but the general situation on Lake Kariba itself is now more promising than in recent years. With the increase in the size of the lake to its full capacity and the increase in storm damage to *Salvinia* the percentage cover of the lake by *Salvinia* has decreased considerably and the plant remains a serious problem only in harbours and river mouths.

Much of the routine advisory work concerned with weed killers, normally carried out by this branch, is now carried out by the Pests and Weeds Branch of the Department of Conservation and Extension, but the Herbarium deals with a considerable number of identifications of weeds.

The following is a list of the more important species which came to our notice in this way: *Sida cordifolia, Oxalis latifolia, Dichondra repens, Cyperus esculentus, Xanthium pungens, Brayulinea densa, Tithonia rotundifolia, Ceratophyllum demersum, Nymphoides indica, Euphorbia prostrata, Eleusine indica.*

Medicinal Plants

A collection was made in collaboration with Mr. Newby-Fraser of Lederle of five kilos of each of the following plants: *Annona stenophylla, Elephantorrhiza elephantina, Cissampelos mucronata, Grewia flavescens, Gnidia kraussiana, Monotes glaber, Xeromphis obovata, Thunbergia lancifolia, Trichodesma physaloides, Turraea nilotica* and *Vitex payos*. They are being tested for medicinal properties by the Cyanamid Overseas Corporation and are a selection of the plants mentioned in a paper by Dr. Gelfand and Dr. Wild entitled "Some Native Remedies at Present in Use in Mashonaland".

Poisonous Plants

Many specimens of suspected poisonous plants have been determined for the B.S.A. Police, Government Analyst and Veterinary Research departments.

The joint article on "Poisonous Plants of Southern Rhodesia" by Dr. Shone, formerly of the Veterinary Research Department, and Mr. Drummond is with the printers. It is hoped that it will be published as two parts of the *Rhodesia Agricultural Journal*.

Mr. Drummond made an extensive tour of Matabeleland to investigate poisonous plant problems. The tour was undertaken at the request of, and in collaboration with, the Veterinary Department. Farms in the Gwaai River, Lupane, Gwaai Siding, Kazungula, Nymandhlovu, Inyati and Fort Rixon areas were visited.

It was recommended that feeding trials should be carried out in Bulawayo on the plants which were most strongly suspected.

Legumes

A provisional alphabetical list of the legumes indigenous to and naturalized in Southern Rhodesia has been produced for Mr. Corby for use in connexion with his work on nodulation.

Botanic Garden

Progress has been made in achieving a more park-like effect in the southern part of the garden. Many uneven areas have been levelled and 200 bags of indigenous couch grass have been planted.

The nursery is now established, several hundred species of indigenous and exotic trees and shrubs have been sown and approximately 2,500 plants have been potted up. A substantial proportion of them will be ready for planting out during the coming rains.

A start has been made with the planting of a hedge of suitable spiny euphorbias along the boundary of the garden. So far 200 yards have been planted to *E. hislopii* and *E. splendens* var. *prostrata.*

A further 200 indigenous trees were planted out in various parts of the garden. One rockery in the vicinity of the Herbarium has been planted to indigenous succulents, use being made of the natural rock formation.

The first *Index Semimum,* which includes 206 species of indigenous plants has been produced. Two hundred and twenty lists have been sent to botanic gardens in many parts of the world. As a result over 1,500 packets of seed have been sent to 65 institutions in Asia, Africa, Australia, North and South America and Europe. In exchange some interesting collections of seed have already been received from several countries.

An extension line of the reticulation system has been surveyed which will enable a start to be made on the planting of exotic sections during the coming rainy season.

Planning

The plan of the intended roads and landscape features around the Herbarium has been completed. To assist with this, a two-foot contour survey has been made of the area concerned, with the assistance of the Department of Works. The new road serving the Herbarium is being put out to tender. It is intended to spend the best part of our remaining capital on an entrance gate and the development of the areas adjacent to the Herbarium.

Miscellaneous

Numerous aphid hosts have been identified for the Tobacco Research Board and the Agricultural Research Council, while Dr. Wild visited Hippo Valley to identify wild aphid hosts in connexion with Burley tobacco investigations.

Numerous plants have been named for the zoology department of the University College of Rhodesia and Nyasaland Botany Department in connexion with bush control research.

Visitors

Visitors to the Herbarium included: W. R. Bainbridge to work on his Gwembe Valley checklist, I. R. Dale, L. C. Leach to work on euphorbias and stapeliads, H. D. L. Corby to work on legumes, B. L. Mitchell to discuss the ecology of Kafue National Park, D. S. Mitchell of the University College of Rhodesia and Nyasaland to work on ferns, E. A. Robinson to discuss *Cyperaceae* problems, G. L. Guy, A. S. Bouhey, A. J. Salubeni of the Malawi Agriculture Department worked for six weeks to gain herbarium experience, R. M. Strang, W. B. Cleghorn, O. West, D. C. H. Plowes, H. J. van Rensburg, Mr. Rice of the University College of Rhodesia and Nyasaland worked for two months in the Herbarium on the correlation of the occurrence of simple and pinnate-leaved trees with rainfall.

Publications

Kirkia, Vol. IV.

H. Wild (1964). "A Revision of the Genus Anisopappus Hook. and Arn. (*Compositae.*)" *Kirkia* 4: 45–73.

H. Wild (1964). "The Endemic Species of the Chimanimani Mountains and their Significance." *Kirkia* 4: 125–157.

H. Wild (1964). "New and Interesting Species". *Kirkia* 4: 159–164.

PLANT PATHOLOGY

Laboratory

The number of diseased specimens submitted for identification and report by members of the public, extension officers and research stations amounted to 399 and this shows a considerable decrease over the previous year. This was due mainly to the exceptionally poor rainy season in many parts of the country which suppressed the development of most of our more serious diseases. Numerous cases of frost injury were referred to this laboratory as a result of the exceptionally low temperatures experienced in June and July.

New records of interest included: Root rot of pears caused by *Armillaria mellea*, leaf spot of rhubarb caused by *Colletotrichum erupens*, downy mildew of soya beans caused by *Peronospora manshurica*, anthracnose of youngberry caused by *Elsinoe veneta*, blast of rice caused by *Piricularia oryzae*, and speckle of banana leaves caused by *Ramichloridium musae* and *Cladosporium musae*.

New host records for *Dothistroma pini*, the cause of needle blight of pines, included *Pinus lutea*, *P. hartwegii* and *P. elliottii*, but the disease was less severe than on the highly susceptible *Pinus radiata*. In the case of *P. elliottii*, more needle blight developed on the var. *densa* than on var. *elliottii*.

During the year a revised list of plant diseases recorded in Rhodesia was compiled and this will be published in *Kirkia* next year.

Crops

Tobacco

Tobacco veinal necrosis virus (necrotic strain of potato virus Y) was found in only one crop during the 1963–64 season. A single plant in a Burley crop at Arcturus showed typical symptoms of the disease and this was confirmed by inoculation tests. In spite of intensive surveys carried out with the co-operation of the Tobacco Extension Service, no further outbreaks of this disease were discovered and there are encouraging signs that the disease has remained extremely localized. All test plantings of Burley tobacco made in potato crops in the Arcturus area remained free from Necrotic Y infection. On the other hand, numerous outbreaks of the common strain of potato virus Y occurred on Burley crops and this virus disease represents a serious problem where Burley tobacco is grown in close proximity to infected potato crops. Flue-cured varieties are not noticeably affected by this common strain of virus Y.

Severe outbreaks of tobacco leaf curl occurred in Burley crops planted in the south-eastern lowveld and, unless satisfactory control measures can be developed, this virus disease could seriously affect production in the area.

Anthracnose was more common than in the previous year in tobacco seedbeds, apparently being favoured by the unusually high October rainfall in many areas. A carry over of the disease in the soil and wash of inoculum from previous seedbed sites was suspected in most cases.

Granville wilt (*Pseudomonas solanacearum*), a disease of very local occurrence in Rhodesia was recorded for the first time from the Umvukwes area.

Maize

Leaf blight caused serious damage to a crop grown under overhead irrigation at Gwelo, but little infection was reported elsewhere in the country.

Dry rot of maize caused by *Nigrospora oryzae* was more common than usual, being associated with unthrifty growth brought about by drought conditions towards the end of the growing period.

Maize streak virus on the whole was less common than usual but caused serious damage to a main planting at Enterprise.

Rice

Blast caused by *Piricularia oryzae* was recorded for the first time in Rhodesia and seriously damaged a crop at Rusape.

Wheat

Commercial summer wheat crops in the Hunters Road/Gwelo areas suffered severely from drought, resulting in almost complete crop failure in some cases. The incidence of stem rust was negligible and in no instance did this disease have any serious effect on yield.

In the winter crops up to 30th September, 1964, stem rust was entirely absent throughout the country, even in the Sabi Valley where in previous years the disease has regularly been severe. The complete absence of stem rust is most unusual and was possibly associated with the exceptionally severe winter experienced over the whole of southern Africa. There are reasons for suspecting that outbreaks of stem rust in Rhodesia actually arise as a result of spore incoulum blown into the country from South Africa. The stem rust race pattern in the two countries is very similar, thus suggesting a common source of inoculum. The absence of stem rust in Rhodesian winter crops this year could therefore have been due to the suppression of rust development in South Africa associated with the unusually cool climatic conditions.

Leaf rust (*Puccinia recondita*) was present although only in trace amounts in some winter crops. Even in the Sabi Valley where leaf rust is usually severe on most varieties the disease developed too late to be of any consequence.

Potatoes

Due to the unusually dry conditions very few outbreaks of late blight occurred in the summer rainfall crops and even in the higher rainfall areas of the Eastern Districts the disease appeared too late in the season to cause any substantial reduction in yield.

Potato virus Y, including the leaf drop streak symptom, was frequently recorded on crops grown in the Salisbury and Enterprise areas and there was also an increased incidence of potato leaf roll virus.

Unusually heavy attacks of mildew (*Erysiphe cichoracearum*) occurred on the second irrigation crop in several areas during 1963.

An unusually severe attack of silver scurf (*Spondylocladium atrovirens*) resulting in the destruction of many eyes in the tubers occurred in a crop intended for seed at Inyanga. This disease is not normally regarded as serious and the severity of this particular outbreak was apparently due to leaving the tubers in the ground for too long a period after reaching maturity and to humid conditions in storage.

Legume Crops

In the variety trial at the Grasslands Research Station all plants of the variety Hood showed puckering and curling of leaves, whereas other varieties were unaffected. At the Salisbury Experiment Station this variety was normal in appearance, although such symptoms did appear last year. The possibility of a virus being involved, as was previously suspected, now appears unlikely and some environmental factor may be responsible.

Downy mildew was recorded for the first time in local plantings of soya beans and marked differences in varietal susceptibility were noted, with most varieties appearing to be highly resistant. Heavy infection occurred on 56S19 and 54S70 and slight attacks appeared on 50S257 and N57S85.

Vegetables

Although bacterial canker was again extremely widespread, careful growers are now managing to keep this disease in check by enforcing strict crop hygiene, crop rotation, and by improving cultural practices. Many growers on the other hand are still creating conditions favourable for the rapid spread of the disease in the field by planting the seedling on the side or even at the base of irrigation furrows instead of planting on ridges. Rapid spread of the disease very often occurred where the foliage and stems came into contact with the irrigation water.

Other diseases of tomato, including late blight, and diseases of vegetables in general were of minor importance due to the low rainfall and long intervals of dry weather between rainstorms.

Several cases of blossom-end-rot of water melons were encountered, this physiological disorder being associated with drought and irregular soil moisture supply.

Citrus

Further cases of virulent black spot were discovered during the year and the disease is now known to occur in isolated orchards at Bulawayo, Heany Junction, Gwelo, Odzi and Old Umtali. It appears that the disease is more widespread in Rhodesia than previously supposed, but in general, the attacks have been comparatively slight and remained extremely localized, even within the infected orchards. It is impossible to forecast at this stage how serious black spot could become in this country on oranges but present indications are that local climatic conditions may not be conducive to severe attacks, provided steps are taken to avoid out-of-season cropping and provided the mature fruit is harvested before the beginning of the rainy season. It has been encouraging to note that the situation in the orchard at Gwelo where the disease was first discovered three years ago has improved considerably now that measures have been adopted to prevent out-of-season cropping.

Deciduous Fruit

Summer fruit diseases including bitter-rot, ripe spot (*Gloeosporium fructigenum*) and sooty blotch of apples were less common than usual, but bitter pit of apples, a physiological disorder which is promoted by drought conditions, increased in prevalence.

Powdery mildew was common on the fruit of susceptible peach varieties but most commercial growers managed to prevent infection by applying wettable sulphur sprays during the early period of fruit development.

It became apparent that satisfactory control of apple mildew, by applying four to six applications of wettable sulphur or karathane at weekly intervals during the early part of the growing period commencing at bud movement, is only possible where there is no problem of delayed foliation. Under mild winter conditions, and particularly with varieties requiring greater amounts of winter chilling, timely application of DNOC to prevent delayed foliation is an essential prerequisite for satisfactory mildew control.

Sugar Cane

At present the overall reduction in yield of sugar cane caused by plant disease is extremely low. Gumming disease due to *Xanthomonas vasculorum* was again found in some plantings of NCo 310 but the symptoms were relatively mild and it seems unlikely that this disease could become really serious under our climatic conditions.

Smut is becoming increasingly common on the susceptible commercial variety NCo 310 and could become a serious problem in later planting cycles if susceptible varieties are planted on infected lands. Arrangements have therefore been made to carry out smut susceptibility tests on all varieties showing promising agronomic characteristics.

Coffee

Berry blotch due to *Cercospora coffeicola* was again the most common infectious disease of coffee. An unusual form of the disease appearing as small sunken lesions on the berries in addition to the more typical extensive blotches, developed in two plantings following a spell of unusually cool weather in early July. Infection of these berries probably occurred some weeks or even months previously. There are a number of reasons for suspecting that *Cercospora coffeicola* is able to cause a latent infection of the berries without necessarily producing lesions even when the berries are mature. Disease expression appears to be promoted by extremes of temperature and the disease is often severe on unthrifty bushes affected by overbearing and die-back. Little is known at present about the etiology of this disease and more detailed investigations are to be carried out in the near future.

Research

Wheat

During the summer at Salisbury, stem rust first appeared on 20th February, but dry conditions retarded spread of the disease. Eventually, sufficient infection developed to allow

for assessment of varietal resistance, but the final readings were lower than in the previous years. No stem rust at all appeared in the winter wheat nursery planted in Salisbury.

The most outstanding feature in the International Spring Wheat and African Uniform Rust Nurseries was the development of susceptible type pustules on the variety Reliance and the freedom from rust on Acme until very late in its life. Reliance is immune to race 21, hitherto the commonest race in Rhodesia and this variety has only become infected in the past when race 34 was present. Race 34 has not however been found in recent years. Subsequent testing of the rust from Reliance showed it to be the race now temporarily designated SR1. Isolations from the nursery in general showed that race SR1 was dominant with race 21 appearing later in the season.

A number of Rhodesian varieties were tested during the summer to test their reaction to natural infection of stem rust by races 21 and SR1. Marodzi was severely infected, whereas Mazoe remained resistant and a satisfactory level of resistance was found in lines of the S473 series (Kafue X S29A1) and in the three S595 lines. F430, the main source of resistance in the wheat-breeding programme remained immune and F398 will probably also be a useful source of resistance.

During the year 36 race determinations were made from material collected over the whole country. The race designated SR1 occurred more frequently than 21, whilst race 16 was found only once. Race SR1 is so designated because the reaction it causes on the international tester wheat varieties are not matched by those of any other race listed in the international list of stem rust physiologic races. It is more similar to race 232 than to any other race and it is interesting to note that a race resembling 232 has recently been found in South Africa. This provides further evidence that the Republic and Rhodesia are in a single geographical area with regard to rust dispersal.

Studies on the inheritance of resistance to stem rust were commenced using five wheat varieties from the breeding nursery and seven varieties from the international nursery. The intention is to study the mode of inheritance of resistance to local stem rust races. In preliminary tests against race 21 the results indicated that in Gabo and Kafue, resistance is conditioned by one dominant gene, whilst in F430 the resistance is due to two dominant genes.

Citrus

Numerous leaf samples collected from most of the larger commercial orchards and from private gardens were subjected to an incubation technique designed to express any latent infection by the black spot fungus *Guignardia citricarpa*. Special attention was given to trees used as a source of budwood by local registered nurserymen. Except where the leaves had been collected from trees showing black spot symptoms on the leaves or fruit, all samples proved to be negative for *Guignardia citricarpa*. Many samples carried a latent infection of the other harmless species of *Guignardia* and this could only be distinguished with certainty from the black spot fungus on the basis of different characteristics in pot culture. Examination of orchards at a time when fruit is mature is now considered to be a more reliable and more practical method of checking orchards for the presence of this disease than by following the lengthy and tedious technique of testing leaf samples for possible latent infection. Testing of leaf samples will, however, be continued on material used for propagation as an additional check for the disease.

Legume Crops

Seed was collected from single soya bean plants showing symptoms of soya bean mosaic virus and then planted to determine the amount of seed-borne infection. No virus symptoms appeared in the progeny of some infected plants, due possibly to late plant infection, whilst in others the seed-borne infections ranged from 6–27 per cent.

Fibre Crops

Several varieties of kenaf planted at Henderson Research Station were inoculated to determine their susceptibility to anthracnose and only the variety Purja showed any marked degree of resistance to this disease.

PUBLICATIONS

Whiteside, J. O.—"Diseases of Stone Fruits in Southern Rhodesia." *Rhod. Agric. Jnl.* 61, 3. 54–60, 1964.

Whiteside, J. O.—"Diseases of Pome Fruits in Southern Rhodesia." *Rhod. Agric. Jnl.* 61, 4. 73–81, 1964.

Loveless, A. R. (U.C.R.N.) and Herd, G. W.—"Studies of Rhodesian Ergots No. 2. Redescription of *Claviceps sulcata* Langdon." *Kirkia*, vol. 4, 1964.

SEED SERVICES

Laboratory

The number of samples received for testing declined to 2,297, compared with 2,614 in the previous year. However, the number of germination tests increased from 6,178 to 6,302. Ten per cent. of all samples received for purity and germination were rejected as being below standard.

With the expansion of bean and lettuce seed for export, the number of phytosanitary certificates issued for crops inspected in the field increased from 215 to 345. Certificates of wholesomeness (issued in conjunction with the Chemistry Branch), dropped from 37 to 21. Similarly there was a decrease in the number of international seed testing certificates (the orange certificate) from 41 to 29 in the past year.

Inspection Service

The Seed Inspector paid 412 visits to various seed wholesalers and retailers and sampled 57,163 lb. and 4,930 packets of seed in pursuance of his duties under the Seed Act. In addition, 203 visits were made to sample over 2,694,787 lb. of seed for the various certification schemes and seed designated for export.

Five hundred and ninety-one field inspections totalling 6,384 acres were made to inspect various seed crops for seed associations and seed houses engaged in the export trade.

If all samples tested are analysed in relation to source the results are as follows:

Category	*Source*	*No. of samples*
1	Samples tested for seed export trade	743
2	Samples tested for seed associations (also including samples in Category 1)	806
3	Samples tested for routine legislation (excluding Categories 1 and 2)	480
4	Samples tested for advisory and research purposes . .	253
5	Samples tested for ISTA referee tests	15
	TOTAL	2,297

Individual Crops

MAIZE (14.8 per cent. of total samples submitted for test).

Samples showed an average germination per cent. of 98.12 (max. 100.0, min. 81.0). Quality of the certified seed maize was maintained. Only 8 per cent. of samples showed over 0.1 per cent. *Diplodia zeae* infection on the kernels.

BEANS (11.6 per cent.).

Samples showed an average germination per cent. of 90.8 (max. 98.0, min. 50.0).

LETTUCE (13.7 per cent.).

Samples showed an average germination per cent. of 89.5 (max. 100.0, min. 39.0).

GROUNDNUTS (5.6 per cent.).

Samples showed a higher than usual average germination per cent. of 74.1 for untreated seed. With the use of a TMTD seed dressing, the average germination per cent. was increased to 85.5 per cent.

Soya Beans (3.0 per cent.).

Samples showed an average germination per cent. of 85.8 (max. 98.0, min. 59.0). Of the samples tested 76 per cent. produced hard seed at an everage of 6.1 per cent. per sample. A large number of samples contained undersized seed, a fact which can be attributed to the low rainfall experienced at the time of seed-set.

Tobacco (13.2 per cent.).

	Samples			*Per cent. Germination*	
	No.	%	*Average*	*Maximum*	*Minimum*
Burley	14	5.4	94.5	99.0	83.5
Turkish	35	13.4	92.4	99.0	77.5
Virginia	212	81.2	89.7	99.0	26.0
	216	100.0	90.4		

Cotton (1.6 per cent.).

Samples showed an average germination per cent. of 72.5 (max. 93.0, min. 46.5). With acid-delinted seed, good response to a seed dressing such as TMTD was obtained on the floater fraction of the seed.

Grasses (9.4 per cent.).

SEED QUALITY COMPARISONS 1961–62 to 1963–64

		Purity Av. %	*Germ. Av.* %	*PLS Av.* %	*No. of samples*
Katambora	1961–62	61.18	65.2	40.6	40
	1962–63	63.90	63.7	41.8	29
	1963–64	70.00	66.5	47.3	33
Giant	1961–62	45.57	45.1	20.6	21
	1962–63	44.42	40.4	19.3	19
	1963–64	49.97	32.0	16.0	1
Weeping Love Grass	1961–62	96.97	83.2	80.8	13
	1962–63	97.87	83.9	82.1	13
	1963–64	97.46	79.8	77.6	5
Sabi Panicum	1961–62	60.46	56.3	36.4	13
	1962–63	46.19	42.0	21.4	17
	1963–64	63.34	42.5	26.6	19

Research and Investigations

A number of investigations into laboratory-testing methods were carried out; some of those showing definite results are reported below.

Panicum maximum — Sabi Strain

A comprehensive analysis was undertaken by the A.R.C. biometrics team to compare our germination results from 37 samples of this grass seed obtained in the seasons 1962–63 and 1963–64 using 36 methods of test, i.e. 1,332 tests. There were no replicates of the methods of test due to shortage of equipment. The general trend found in the results suggests that the current set of 36 tests may be reduced to 16 or even lower. This result has already meant a substantial saving in both time and equipment for this particular seed. The analysis of this large mass of data was only made possible by the use of the I.C.T. 1500 computer, a machine that makes this type of analysis an economic proposition.

Slant Germination Tests

The germination of certain seeds carried out on the slant (67°) was compared to the normal horizontal method. Results have shown that the former method saves up to 40 per cent. space on the Copenhagen water bath and that first counts are consistently higher. At present, no significant differences can be found on the final count between the two

methods. The slant germination method has been adopted as standard procedure for sorghum seeds.

Legislation

The detailed review of the proposed new seed regulations was completed during the year. It was also agreed, after consultations with the Chemistry and Entomology branches and Veterinary Department to draft an entirely new Seed Bill. Accordingly, provision has been made in the Bill to cancel all clauses pertaining to seed in the existing Fertilizers, Farm Feeds, Seeds and Remedies Act. It is anticipated that the first reading of the new Seed Bill will take place early in 1965.

Seed Production

Despite staff difficulties, all requests to inspect seed crops for various seed associations were dealt with.

The following are some comments on the principal seed crops.

Horticultural and Crop Seeds

Out of a total of 1,727 acres, over 1,081 acres were grown in the African irrigation settlement areas. Yields were below average due to the unusual frosts experienced in the area towards the end of June. There was little evidence of the major seed-borne diseases such as anthracnose and bacterial blights. Two hundred and sixty-four acres of beans were inspected in Moçambique for a local seed firm who have now imported the seed for cleaning and processing in this country.

Lettuce seed production continued to expand and further expansion is still required by the export trade. This country is favoured by the seed trade for lettuce seed production due to the relative absence of lettuce mosaic virus in our seed crops. Tomato seed production areas showed no evidence of bacterial canker. Flower seed production remained in the hands of skilled growers, who appear to be obtaining economic yields after a few years' apprenticeship with these difficult crops.

A new cotton seed certification scheme was initiated under the aegis of the Cotton Growers' Association. In the past season, four growers multiplied the breeders' seed of Alba 632 by the Gatooma Research Station. This seed has now been released to seven growers each growing 30 acres, and the cotton seed from this stage should be sufficient for sales of certified seed to commence for those growers requiring good-quality seed for the 1965–66 season.

Wheat seed production has continued with the varieties Mazoe and Marodzi released to growers in the previous two years. Of the new releases, 473 B4 A4 (called Umfuli), 473 B4 and 473 E6, 50 lb. were released to selected growers for further multiplication during the past season.

Pasture Seed

An estimated 66,227 lb. of Katambora Rhodes, 11,050 lb. of *Sabi panicum*, 23,254 lb. of *Sabi panicum* and 4,440 lb. of Ermelo Love Grass was produced from 2,090 acres. Three seed lots were rejected due to high weed-seed content. Henderson Research Station released two promising pasture legumes, *Desmodium intortum* and *D. discolor* to the association for further multiplication. Some difficulty has been experienced in finding the best areas to produce *Desmodium intortum* seed as the plant appears to require a long growing season before flowering commences. Two promising grasses have also been released from Grasslands Research Station for bulking-up, i.e. *Paspalum plicatulum* (Beehive Paspalum) and Wintergreen Paspalum.

Seed Potatoes

Six crops were rejected and one down-graded because of varietal impurity, bacterial wilt or mosaic. Two crops rejected for bacterial wilt have caused some concern. Steps have now been taken to register all lands designated for certified seed production and it is anticipated that this will prevent the occurrence of this disease in those areas set aside for high-quality seed production.

Rejected at tuber inspection were 19.5 per cent. of seed for B grade and 16.1 per cent for A grade, the chief causes being tuber moth infestation and wet rots. All cases were investigated and it is gratifying to note that no cases were taken any further by the plaintiff after they have received our reports.

Tobacco Seed

The past season has been one of the most successful ones in the history of the Rhodesian Tobacco Seed Association. Whereas in 1962–63 only 17 out of 29 seed crops passed all seedbed and field inspection, this past season 26 out of 34 seed producers were successful. The reason for this season's withdrawals and rejections were as follows: anthracnose, 1; withdrawn (N.R. growers), 2; withdrawn (resigned from association), 1; and withdrawn (ample bank stocks), 1.

With the dissolution of the Federation, Seed Services suffered a loss of staff and concern has been expressed as to the adequacy of the inspectorate services for the coming season. An assurance has been given by the Seed Services Section that the requirements of the Rhodesia Tobacco Seed Association will be met adequately in spite of staff difficulties.

Sales of 18,045 ounces of Rhodesia Tobacco Seed Association seed and 4,061 ounces of Tobacco Research Board seed were effected. Over 1,355 ounces were exported to 14 different countries, the main customers being Angola, Moçambique, Malaysia and the Azores. The tobacco seed bank maintained by the section received 43,304 ounces from Rhodesia Tobacco Seed Association and 50,392 ounces from the Tobacco Research Board for storage. With the installation of an air-conditioning unit in the seed store, it will be possible to store slightly less popular varieties for several years and thereby supply the trade with these varieties when required. The Seed Inspector cleaned, treated and packeted 6,036 ounces of Tobacco Research Board seed for sale under the seal of the Rhodesia Tobacco Seed Association.

Publications

Hanssen, K. B.—"Good Seed Doesn't Cost, it Pays." *The Rhodesia Farmer,* 7th Feb., 1963. Bull. 2221.

Hanssen, K. B.—"God Seed Doesn't Cost, it Pays." *The Rhodesia Farmer,* 7th Feb., 1963.

Humphreys, J. R.—"A Case for Expansion of Soya Bean Production in Rhodesia." *Rhod. Agric. Jnl.,* Mar./April, 1964. Bull. 2239.

CHEMISTRY AND SOIL SCIENCE

General Review

The activities of the Chemistry Branch have continued to be strongly influenced by staff changes, more especially on the research side. Although five new appointments were made during the year four vacancies remain.

Changes have also occurred in the technical staff, with the need to make four new appointments the Soil Testing Section has suffered some reduction in efficiency.

In April the Chief Agricultural Chemist, Dr. H. Weinmann, retired and Mr. R. G. Thomas was appointed to the post. In May Mr. P. McGugan was seconded to the Sabi Valley Experiment Station to understudy Mr. H. R. R. Metelerkamp, Soil Physicist, who will return to Salisbury towards the end of 1964 to restart the soil physics research programme of the branch.

In spite of these difficulties the services provided to other departments and the public have been maintained and, indeed, in certain aspects increased, as the comparative figures for analytical services in Table 1 show.

TABLE 1.—NUMBER OF SAMPLES ANALYSED
(for annual periods from 1st October to 30th September)

	1963–64	1962–63	1961–62
General Analytical Section	5,317	4,747	3,011
Soil Testing Section:			
Advisory	4,668	4,386	3,929
Investigatory	1,395	1,385	1,278
TOTAL	11,380	10,518	8,218

As usual in the Soil Testing Section, the highly seasonal distribution of the influx of advisory samples led to a backlog of 600 samples at the peak of the season. Unfortunately the peak this year occurred six weeks later than normal, and the backlog of samples could only be dealt with in time for the planting season by taking an analyst off other work to increase the output of the section.

With the limited number of experienced pedologists available the Soil Survey Section has continued to co-operate very closely with the Ministry of Water Development in reconnaissance surveys of the areas scheduled for development in the south-eastern lowveld. All requests for this type of work have been met, and reports and maps have been produced by the time they were required. Pedological assistance has also been given to the Department of Conservation and Extension, though not on the scale required, owing to limited facilities and the high priority of development surveys.

On the research side the position has been unavoidably less satisfactory. Soil physics work has been virtually in abeyance, pending the return of the Soil Physicist to Salisbury, which is planned for the near future. In the meantime a programme of work has been agreed on, and some co-operative work with research stations on the pattern of moisture withdrawal by crops of different rooting habits has been initiated.

The spectrographic laboratory has remained closed throughout the year for the lack of a trained spectrographer and this has affected the advisory service adversely. Spectrographic analysis of plant material is a valuable aid to the Soil Testing Section in diagnosing nutritional disorders of growing crops. It is intended to train a chemist specially for this work and reopen the laboratory during the coming year. In the meantime special and urgent problems that arise are being investigated with the assistance of the Forensic Scientist of the B.S.A. Police and the Spectrographer of Geological Survey. Their help is gratefully acknowledged.

Work on aflatoxin contamination of groundnuts has been continued on an expanded scale and further expansion is planned for the coming year, in collaboration with other specialist branches, the Department of Conservation and Extension, and the Grain Marketing Board.

The Senior Agricultural Chemist, responsible for soil survey and pedology, has continued his work on a new pedogenetic system of classification of Rhodesian soils. A draft map on a scale of 1 : 1,000,000 has been completed, and he has made considerable progress with a comprehensive account of the system and a description of the morphology and constitution of the soils of the country. When completed and published, this work will be of great value to agriculturists within Rhodesia and it will provide a basis for comparison of soils with those of other African territories.

A necessary adjunct to this work, and also to that of the Soil Productivity Research Team of the Agricultural Research Council, is mineralogical investigation of the clay and coarser fractions of the principal soil types. A limited amount of work has been done, but much more is required and intended, when a suitably trained officer is recruited. It is

felt that work along these lines will provide the most useful contribution that the branch can make to fundamental soil studies, now that the soil fertility research carried on by the branch for a number of years has been largely taken over by the Agricultural Research Council.

During the year progress has been made in the field of legislation that the branch is required to implement. New regulations to cover the sale of fertilizers and the sterilizing of animal products were promulgated in December, 1963, and considerable progress has been made in revising the regulations to cover farm-feeds.

Throughout the year members of staff have delivered talks and lectures to numerous in-service training courses of the Department of Conservation and Extension, to courses for tobacco growers and school teachers organized by Conservation and Extension, to students of Chibero Agricultural College, and to farmers' associations.

Members of staff have also served on various standing committees. With the retirement of Dr. H. Weinmann the Ministry has been represented on the Pharmaceutical Committee and Animal Feeding Stuffs Committee of the Standards Association of Central Africa by Mr. D. G. Bushnell, Officer-in-Charge of the General Analytical Section.

In June, Mr. J. G. Thompson attended the ninth ordinary meeting of S.A.R.C.C.U.S. held in Durban, as a member of the Southern Rhodesian delegation, and he presented a report on the work of the Standing Subcommittee on Soil Science, of which he is convenor.

Since the publication in 1949 of a revised edition of the bulletin *Analyses of Rhodesian Foodstuffs,* a considerable amount of additional analytical data has been accumulated. Mr. D. G. Bushnell has made good progress with a systematic collation of these data into a draft of a new publication, in which an improved method of presentation is used. Part I (concentrates) and Part II (silages) are available in cyclostyled form for limited circulation to professional officers Part III (roughages) is in preparation, but will not be ready for some time. If the demand is great enough, consideration will be given to publication of Parts I and II separately from Part III.

Papers published or submitted for publication are listed at the end of this Report. In addition members of the branch contributed a section on the fertilizer requirements of cotton for inclusion in a handbook to be produced by the Gatooma Research Station.

General Analytical Section

The yearly output of the main laboratory in Salisbury has continued to increase, as shown in Table 1. It has been possible to keep abreast of the normal commitments of the section, but no time has been available to embark on any *ad hoc* research problems, with the exception of aflatoxin investigations, which are mentioned elsewhere in this Report.

With regard to analysts on the research stations, although the position has been more satisfactory than in previous years, only one station has had an analyst operating throughout the entire year. Nevertheless, the research station laboratories, when operative, have carried out a considerable volume of work. At Henderson Research Station, where work has been uninterrupted, the analyst has completed 1,007 protein determinations on feeds, grass samples, and urine and faeces samples, and 77 complementary determinations of potassium, phosphorus, and calcium on feed samples. In connexion with the rumen digestion work on the station, he has determined the sodium and potassium levels in 203 urine and rumen-content samples. He has further assisted the biochemist on the station with the analysis of another 569 samples.

During the first four months of the year when an analyst was at Grasslands Research Station, 918 samples were analysed for their protein content and 108 samples for calcium. Since February all analysis for this station have been undertaken at the main laboratory in Salisbury.

In the seven months that an analyst has again been stationed at Matopos Research ion, the analysis of 1,356 samples has been completed, of which 526 samples were for tein determination only, and 239 for full feed analysis.

The nature and origin of the samples analysed in the general analytical laboratory ummarized in tables 2 and 3, respectively. It is interesting to note that of the 5,317 ples analysed during the year under review only 147 were from non-Government sources, ch represents a decline in work for which fees are charged, compared with the previous e years. This is possibly because there are at the moment very few new enterprises ning up in the agricultural field and the larger established enterprises now have their n laboratory facilities or use private consulting analysts. Remarks follow on the principal egories of samples listed in Table 2.

LE 2.—SAMPLES ANALYSED IN THE GENERAL ANALYTICAL LABORATORY

	1963–64	1962–63
tilizers, manures and liming materials:		
Inorganic fertilizers	14	8
Organic fertilizers	55	14
Fertilizers (under the Act)	73	39
Liming materials	21	50
Liming materials (under the Act)	0	2
Miscellaneous fertilizers	7	3
m-feeds and vegetable products:		
Farm-feeds	92	78
Farm-feeds (under the Act)	37	104
Maize	240	82
Other cereals	195	104
Legumes	234	235
Tobacco	0	0
Grasses and hays	772	1,196
Silages	17	105
Other vegetable products	235	46
imal products:		
Blood samples	642	275
Other animal products	69	26
eds and faeces from feeding trials	329	688
eck samples from research stations	195	69
s and oilseeds	1,297	634
Essential oils	1	1
Waters	117	297
xicological specimens:		
Analyses for Arsenic-positive	222	145
Analyses for Arsenic-negative	316	389
Other poisons	100	60
otection products:		
Arsenical dips	22	18
Organic dips	11	13
Other plant-protection products	1	6
scellaneous	3	60
TOTAL	5,317	4,747

TABLE 3.—ORIGIN OF SAMPLES ANALYSED IN THE GENERAL ANALYTICAL LABORATORY

	1963–64	1962–63
Chemistry Branch (including official samples)	755	559
Other specialist branches	104	291
Departmental research stations	2,940	2,551
Veterinary Department	1,040	878
Department of Conservation and Extension	216	173
Other Government departments	115	45
Private individuals and companies	147	250
TOTAL	5,317	4,747

SAMPLES TAKEN IN TERMS OF THE FERTILIZERS, FARM FEEDS, SEEDS AND REMEDIES ACT, 19

Owing to the volume of other routine analytical work, it has not been possible maintain the same volume of regulatory analyses as in the previous two years. In this ye 73 fertilizer and 37 farm-feed samples have been taken and analysed. Only minor labell discrepancies have been noticed with farm feeds, while with fertilizers the manufactur do not appear to be fully conversant with the new fertilizer regulations yet, but the posit is improving.

FERTILIZERS, MANURES AND LIMING MATERIALS

The total number of samples analysed under this heading has risen from 71 in 1962- to 97 in this year. It will be noted that the number of liming materials analysed has dropp considerably, whilst the number of organic manures has increased. This is probably beca the agricultural lime industry in Rhodesia is now stabilized and the Zambian indust which is in its infancy, now turns to a local laboratory for analytical services. Also, th is a resurgence of interest in this country in the use of bat guano in peasant farming, a it is samples of this material that comprise the bulk of the organic manures analysed.

FARM FEEDS AND VEGETABLE PRODUCTS

The volume of work in this category has decreased slightly, but there will always be variation in the number of samples analysed, because of the varying staff position on research stations. The absence of an analyst at Grasslands Research Station for over h the year has resulted in the Salisbury laboratory undertaking the analysis of over 863 pl samples from this source, compared with only 150 samples last year. This is, to so extent, balanced by the reduction in plant samples analysed for Matopos Research Stati from 977 in 1962–63 to 349 samples this year. Also in the year 306 samples were su mitted by the Salisbury Agricultural Experiment Station, as well as smaller numbers fr Chibero College and the Eastern Highlands, Henderson and Sabi Valley experiment statio

ANIMAL PRODUCTS

There has been over 100 per cent. increase in samples of animal origin over the p vious year's figures. This is mainly due to the large number of plasma and serum samp analysed for the Game Research Officer of the Veterinary Department, who is engaged fundamental blood studies on game animals.

Also in this category 108 samples of blood have been analysed in connexion with aphosphorosis trial in the Shangani area, and 148 blood samples from Matopos. Sixty eg were tested for their keeping quality for the Poultry Officer.

FAECES AND FEEDS FROM FEEDING TRIALS

Now that routine analytical facilities are available at Henderson and Matopos resear stations, the demand for analyses of samples from feeding trials has fallen from 659 samp last year to 329 in 1963–64. Of this total, 90 samples were submitted by Matopos Resear Station and 239 by Grasslands.

LS AND OILSEEDS

Of the large number of samples in this category 618 were from certain depots of the ain Marketing Board and from the Legume Breeder; they were submitted in connexion h an analytical survey of the aflatoxin status of the groundnut crop, on which one ılyst has been engaged throughout the year. A further 71 samples in this category were inected with the same problem.

ERS

The number of water samples has decreased (117 this year, compared with 297 last ır), but this is accounted for to a large extent by the fact that no large number of lysi-ter leachate samples has been submitted by the research stations.

XICOLOGICAL SPECIMENS

The volume of this work rose again this year to 638 samples, but the analysis requested l mainly consists of checking for arsenical poisoning, and in 41 per cent. of cases where s type of poisoning was suspected it was confirmed.

As an aid to the veterinarian in field diagnosis, a prototype arsenic-testing kit, based the Onderstepoort model, has been issued and results so far have been encouraging.

Soil Testing Section

The number of soil samples received for advisory purposes was 4,644, an increase of ıt over 8 per cent. on the previous year. However, the number of samples received in nnexion with research projects and investigations decreased by 41 per cent. to 1,151. onsequently, the total number of samples received (5,795) was 7 per cent. lower than last ar.

The seasonal nature of the advisory work again created the usual problems, but this ar they were aggravated by an unusual distribution in the receipt of samples. The peak of e season was not reached until early August, six weeks later than in previous years, and this time a backlog of 600 samples had developed. Instead of the usual decline, the flux of samples continued to be equivalent to the normal output of the laboratory roughout August and September. However, during these months a tentative reorganization analysts was made at the expense of special analytical work. This had the effect of creasing output by nearly one-third, and by the end of September the backlog was largely minated.

The number of advisory reports issued was 1,181, a decrease of 19 per cent. on the evious year, but these involved the analysis of 4,668 samples, an increase of 6½ per cent. eports were issued also on 1,395 samples submited for compilation of scientific data or rrelation with the results of critical field experiments.

Table 1 shows the range of crops for which fertilizer recommendations based on soil alysis were given, and also the extent to which other Government departments, institu-ons, and other countries use the service.

Table 2 presents comparative data and it therefore includes figures for the previous ar. It is interesting to notice that the number of samples received from Rhodesian farmers is increased by 18 per cent., while those from Zambian farmers have decreased by 61 er cent. One notable change in the various "crop categories" is that the greatest use of e service is now being made by maize farmers, and not tobacco farmers as in previous ars.

Apart from the normal collaboration with research stations in their field experiments, hich has continued, two small trials have been laid down in collaboration with private rmers; one was a lime trial on soya beans, and the other a fertilizer (NPK) trial on inter wheat. The section has also collaborated with Fisons Fertilizers in a four-year sugar-ne trial in the Odzi district.

TABLE 4.—SOIL SAMPLES UPON WHICH REPORTS WERE ISSUED

	Rhodesia	Zambia	Other Countries	To
Advisory:				
Tobacco: Flue-cured	872	88	1	9
Turkish	113			1
Burley	60	5		
Other types		7		
Seedbeds	14			
Maize	1,207	129	2	1,3
Cotton	72	3		
Wheat	16	1		
Potatoes	38			
Other cash crops	64	2		
Green-manure crops	16			
Lucerne and fodder crops	80			
Pastures	31			
Market-garden crops	53	7		
Fruit trees, vines, etc.	47	8	3	
Sugar cane	124			1
Tea and coffee	10			
Other specialized crops	19	1		
African farmers' crops	123			1
Private gardens	110		1	1
Sports clubs	26	1		
Diagnosis and fertility assessment	80	1	60	1
pH tests and liming rates	161	5		1
Moisture retention determinations	4		5	
Special soil surveys	236			2
Conservation and Extension: Test demonstration plots in Tribal Trust areas	599			5
Field trials and demonstrations in farming areas	151	12		1
TOTALS	4,326	270	72	4,6
*Investigatory**				
Chemistry: Research	187			1
Chemistry: Soil survey	46			
Research and Specialist Services	808	2		8
Conservation and Extension	117	13		1
Other Government departments	9			
Statutory bodies	37			
Other scientific organizations	154		22	1
TOTALS	1,358	15	22	1,3
GRAND TOTAL	5,684	285	94	6,0

*Includes only analyses for compilation of scientific data or for purposes of correlati with experimental data or field observations.

TABLE 5.—ADVISORY SOIL SAMPLES REPORTED: COMPARATIVE DATA

This table shows, according to countries and categories of works—

(a) the number of soil samples on which advisory reports were issued;

(b) this number as a percentage of the country total;

(c) this number as a percentage of the grand total from all sources.

	Year under review 1963–64			*Previous year 1962–63*		
	(*a*)	(*b*)	(*c*)	(*a*)	(*b*)	(*c*)
Rhodesia						
Flue-cured tobacco	872	20%		1,105	30%	
Maize	1,207	28%		914	25%	
Other crops	757	17%		672	18%	
African farmers' crops	123	3%		45	1%	
Department of Conservation and Extension:						
Test demonstration plots in Tribal Trust areas	599	14%		408	11%	
Field trials and demonstrations in farming areas	151	4%		Not recorded		
Miscellaneous*	617	14%		536	15%	
TOTAL	4,326		93%	3,680		84%
Zambia						
Flue-cured tobacco	88	32%		310	45%	
Maize	129	48%		215	31%	
Other crops	34	13%		128	19%	
Miscellaneous*	19	7%		35	5%	
TOTAL	270		6%	688		16%
Other Countries						
Flue-cured tobacco	1	1%		3	17%	
Maize	2	3%		7	39%	
Other crops	3	4%		6	33%	
Miscellaneous*	66	92%		2	11%	
TOTAL	72		1%	18		0·4%
Totals from all sources						
Flue-cured tobacco	961		20%	1,418		32%
Maize	1,338		29%	1,136		26%
Other crops	794		17%	860		18%
African farmers' crops	123		3%	45		1%
Department of Conservation and Extension:						
Test demonstration plots in tribal Trust areas	599		13%	408		9%
Field trials and demonstrations in farming areas	151		3%	Not recorded		
Miscellaneous*	702		15%	573		13%
GRAND TOTAL	4,668			4,386		

* "Miscellaneous" includes: private gardens and sports clubs; analyses for diagnostic purposes and liming recommendations only; soil surveys of private estates; analyses for non-agricultural purposes.

Soil Survey Section

Soil Surveys

During the year the following soil surveys were carried out:

(1) A survey on Chirundu Sugar Estate to select soils suitable for further development. Soils that are suitable for irrigation are somewhat limited on this estate, and although several areas totalling about 2,000 acres were demarcated as being feasibly utilizable for sugar cane, the better soils that are normally recommended amount to about 1,000 acres only.

(2) Two surveys covering different parts of Essamby Ranch (now know as Nandi Estates) to assess the suitability of soils for sugar cane production under irrigation. The total area suitable for this crop is of the order of 17,000 acres.

(3) A reconnaissance survey of the Chisumbanje area in the lower Sabi Valley. This is the largest, more or less flat, tract of land on which relatively deep fertile, basalt-derived soils occur in Rhodesia. The main block that can be recommended for irrigation, subject to special precautions and practices necessitated by the intractable nature of such soils when wet, is of the order of 140,000 acres.

(4) A reconnaissance survey of the basalt country on the west bank of the Sabi River, stretching from the western boundary of the Ndanga East Tribal Trust Land to the Chiredzi River. The total area of irrigable soils is about 48,000 acres, comprising roughly 43,000 acres of basalt-derived soils and about 5,000 acres of alluvium. Although inherently very fertile, the basalt-derived soils are generally much shallower than those of the Chisumbanje area. This may have some advantages in that mechanical difficulties in regard to canal and access road construction may not be as severe as in the Chisumbanje area.

(5) A reconnaissance survey of a very large tract of country lying between the Tokwe and Mtilikwe rivers below the proposed Tokwe-Mukorsi Dam. A total of about 32,000 acres of potentially irrigable soils was found, most of which is concentrated in two main localities.

(6) A reconnaissance survey of a similarly large tract of land, also commmandable by the proposed Tokwe-Mukorsi Dam via Bangala Dam. This tract lies between the Mtilikwe and Chiredzi rivers. Excluding the land lying below the existing main canal from the Esquilingwe weir, a total area of about 24,000 acres of soils suitable for most crops under irrigation was found. Over and above this, a further 16,700 acres, approximately, can be recommended for sugar cane and certain perennial crops.

(7) In addition to the survey of the Tokwe-Mukorsi project, Tokwe-Mtilikwe section, soils in the southern part of the Nyajena Tribal Trust area were examined for suitability for irrigation. About 1,500 acres of suitable land was demarcated.

(8) A reconnaissance survey of part of the Mkwasini Crown land area lying along the watershed between the Chiredzi and Mkwasini rivers, below the Manjirenje Dam. Although the map and report have not been completed, it appears that the total area that can be recommended for irrigation will be between 15,000 and 20,000 acres.

(9) A detailed survey of Henderson Research Station has almost been completed, but has been left temporarily in abeyance, owing to pressure of other commitments.

(10) Miscellaneous minor investigations. These include visits to settler farms on Hippo Valley Estate to advise officers of the Department of Conservation and Extension on technical aspects relating to the suitability of soils for irrigation, a visit to the Gokwe area to select sites for cropping trials on the basalt clays and on the sands of the Chirama plateau, and other advisory visits such as those to the Wengi irrigation project, the Tengwe block, African Purchase Area, etc.

ABORATORY WORK

As a result of most of the routine analytical work of the Soil Survey Section being ken over by the Soil Testing Section, the number of soil samples fully analysed shows big drop on the numbers analysed in previous years. Apart from several investigations clay fractions by differential thermal analysis, a total of 64 soil samples was analysed.

Publications

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ava, K.—"The Effects of Calcium and Sulphur on Yields of Groundnuts Grown on a Virgin Granite-derived Soil." *Rhod. Agric. Jnl.* Res. 2, 79–83 (1964).

ENTOMOLOGY

Introduction

The work of the branch has been disturbed by staff changes but this should soon be medied. Mr. M. Hardcastle joined in September as Stored Products Entomologist seconded the Grain Marketing Board and Mr. Broad is shortly to assume duties as Advisory ntomologist. In anticipation of this Mr. C. J. Hodgson has been transferred to Umtali reopen the office there. Mr. Temple-Murray joined the branch to work as Plant Inspector t Salisbury Airport. His duties will cover the examination and certification of fruit and egetables for export as well as the more usual inspections of imported plants.

Once again much of the work done in Salisbury has been concerned with the under-round pests of maize, studies of scale insects and potato tuber moth. The Chief Entomolo-ist has given most of his time to phytosanitary matters. Due to an F.A.O. overseas fellow-ip, the Senior Helminthologist did not embark on any extensive nematological work.

The Chief Entomologist presided at the sixteenth annual council meeting of the Inter-ational Red Locust Control Service, held at Abercorn, Zambia, in July. He attended a oint meeting of representatives from Zambia, Malawi and Rhodesia on phytosanitary pro-edures consequent on the dissolution of the Federation, held in Lusaka in January. He isited Lourenço Marques in June for discussions with the Portuguese authorities which d to the reopening of the export market for seed potatoes to Moçambique. There was no neeting of the Inter-African Phytosanitary Commission during the period under review ut its Scientific Secretary, Mons. L. Caresche, visited Rhodesia in May. He was shown ne approach to phytosanitary work in Rhodesia and visited various branches and research tations as well as attending an important meeting at the Tobacco Research Board's head-uarters when problems associated with blue mould of tobacco were discussed at length.

While on leave Mr. Rose attended the eighth Commonwealth Entomological Confer-nce as delegate for Rhodesia and also the twelfth International Congress of Entomology. He also visited several research stations in the United Kingdom.

The Chief Entomologist or his deputy attended meetings of the Rhodesian Nursery-nen's Association, the Rhodesian Cotton Growers' Association, the National Publications Trust, the R.N.F.U. Congress, the newly formed Weed Subcommittee of the Lake Kariba Committee, the *Rhodesia Agricultural Journal* Editorial Committee, the Pesticides Sub-ommittee of the Standards Association, and various farmers' days and field days.

Investigation and Research

Pink Bollworm, *Platyedra gossypiella*

The incidence of this insect has remained low, and such that work on it by officers of the branch has been unnecessary. This low incidence is doubtless being maintained by regular spraying schedules coupled with strict attention to destruction of crop remnants and the principle alternative host plant, *Hibiscus dongolensis*.

Fruit Insects

Fruit Flies

An attempt was made, in collaboration with the Tropical Products Institute, to inves gate the values of attractants for the control of local fruit flies. Although no suitab source of supply of Mediterranean fruit flies was found, it was found that moles of t Natal fruit fly *Pterandrus rosae* and *Pardalaspis cosyra* were strongly attracted to tra baited with as little as 1 mgm. of Angelica root oil, but that the attraction was short liv Tropical Products Institute has since found from work in the U.S.A. that more than o fraction of Angelica root oil is involved and that fractionation lowers this activity. Th value of further work which would involve synthesis of the complex attractive fractio is thus questionable and seems unlikely to proceed.

Woolly Aphis, *Eriosoma lanigerum*

The old orchard where trials with the parasite *Aphelinus mali* have been carried o at Inyanga was uprooted. The roots were examined for woolly aphis infestation. In no ca was it found to be heavy and in some cases trees which had carried heavy sub-aerial infes tions were quite free below ground. These infestations occurred only in shallow, loose so and in no case was there any evidence of parasitism. The nature of the rootstocks is n known. At a commercial orchard in this area, by contrast, infestations below ground we often more severe than those above, being sometimes present on trees which were cle above ground. *A. mali* has only recently become established in this orchard.

Maize Pests

Maize Snout Beetle, *Systates exaptus*

Investigations into the biology and control of the maize snout beetle and related Cu culionidae were continued. Two field trials were made to evaluate several soil insecticid for protection of germinating maize from attack by grubs in the soil. The trials were plac in fields known to be heavily infested with *S. exaptus*. In the first trial eight treatments we compared in a randomized block design with eight replications. The insecticides were appli as a spray in a band into the soil above the maize seed at planting. The insecticides com pared were Diazinon at ½ lb.; Carbaryl at 1 lb.; Teledrin at 2 lb.; Heptachlor at ½ lb Dimethyl methylthiotolyl thiophosphate at ½ lb.; Bayer 37289 at ½ lb. and Bayer 38156 ½ lb. active ingredient per acre. The only insecticide which gave a significant degree protection to the maize was Telodrin. This result was consistently obtained with asses ments of germination percentage, damage ratings and yields. Yield increase over contr was approximately 19 per cent. Even so the damage ratings indicated that the protectio given by Telodrin was far from complete and hardly economical. A search for a mo effective insecticide must therefore be continued.

The second trial compared various methods of application of insecticides. Diazino was used, but the results were inconclusive.

In view of the disappointing results obtained with soil insecticides, further trials we laid down to evaluate the effect of adult control. Infested maize at Gwebi College w marked into plots at the beginning of January, 1964. In one experiment three plots we sprayed twice with DDT for control of adults feeding on the maize and three plots between the sprayed plots were left untreated. The sprays were applied on the 11th and 18 January as a 0.5 per cent. DDT emulsion. Considerable importance is attached to timi of the sprays, the first of which should be at peak emergence of beetles but before eg laying commences. This may readily be assessed in the field by farmers. Dissections females collected on the 11th January gave nine immature and one mature, and on th 18th January, nine femaes were mature and one was immature. Sampling for beetles show a very good kill by DDT. Subsequent sampling for newly hatched grubs during Februa and March and for full-grown larvae in the soil during September indicated that this trea ment had been very effective in preventing reinfestation of the soil in sprayed plots.

Another experiment in which there were three treatments and six replicates compare the effects of keeping maize plots thoroughly weeded at weekly intervals; treating surfa

of soil with 2 lb. of technical BHC per acre using a low percentage dust to cover the surface of the soil; and no treatments. Soil samples indicated that these treatments had little effect in reducing numbers of larvae surviving in the soil during the following September. BHC is highly toxic to larvae in screening tests in the laboratory but it is phytotoxic if applied in the soil at planting. It had been hoped that the BHC dust would kill a high proportion of the newly hatched larvae dropping from the leaves of plants on to the soil but this did not appear to happen.

Further information was obtained on rotations and food plants of beetles and adults. This confirmed that soya beans and sunnhemp encourage build-up of infestations in lands where this pest is present. Furthermore soya beans were found to be highly susceptible to injury by larvae. Serious damage to tobacco transplants was seen in infested land in the Goromonzi and Marandellas regions. Generally the transplants were able to recover although they were seriously held back at the start.

Maize Streak

Chemical control trials were repeated on a farm at the Umgusa Irrigation Scheme near Bulawayo. Although the level of streak infection was only 1.5 per cent. in control plots this trial confirmed that infection could be reduced by control of the leaf hopper vectors with systematic insecticides. Best reduction was obtained by use of 10 per cent. Thimet granular applied into planting holes at a rate of 20 lb. per acre. Counts of *Cicadulina* spp. showed that the Thimet treatments continued to reduce numbers six weeks after planting. Weekly sprays with a 0.03 per cent. Dimethoate emulsion for eight weeks, commencing with first sprays when plants had two leaves, gave good kill of leaf hoppers and reduction of streak infection in the early stages of plant growth. As the plants grow larger and before the final sprays had been given, the incidence of streak increased to as great a level as in the control plots. The reason for this is not known.

Records of light trap catches of *Cicadulina* spp. have been kept daily for a year. Very few leaf hoppers are collected during the winter months and numbers gradually increase during the summer. At the end of the summer, during March and April, numbers reach very high peaks but they suddenly drop again during May. These high peaks coincide with drying of grasses in breeding areas.

Maize Stalk Borer, *Busseola fusca*

It was demonstrated that the virgin females of the maize stalk borer are able to attract males to cages above water traps set in a maize field. This work is to be repeated and extended in view of the interest being shown in extraction and synthesis of sex attractants for control purposes.

A New Surface Beetle, *Herpiscius somneri*

Heavy losses were suffered in some maize crops in the Chakari District due to large numbers of surface beetles severing the anchor roots of young maize plants. Stands were reduced by more than 50 per cent. It was found that losses were confined to lands where continuous maize had been grown and maize residues left on the surface. Where the residues had been burnt there were no infestations. These observations indicate a method of cultural control which is being practised this season.

Fat John, *Dereodus recticollis*

Weevil grubs were responsible for serious losses to maize and cotton crops in the Gokwe District. The grubs eat into the underground parts of the germinating shoot just below soil surface. Surveys in the area indicated that losses could readily be reduced by sprays with Dieldrin at ½ lb. per acre along the row, and by early winter ploughing. Adults were found feeding on *Combretum* spp. during February.

Potato Pests

Potato Tuber Moth, *Gnorimoschema operculella*

Life History.—Laboratory studies have shown that the moth takes about 36 days to complete its cycle. No diapause was observed, and under these conditions the moth has

about 10 generations per year. It is likely that the moth in the wild state will go through much the same number of generations.

Eggs and First Instar Larvae.—Mating and oviposition can take place within 24 hours of emergence and over the next two days. Egg-laying occurs mostly at night. The colour of the egg changes as it develops and the eggs may hatch at any time during the day. The larva bites its way out of the egg shell, one specimen being timed to take 10 minutes. When placed on a potato leaf the newly hatched larva may begin to penetrate in an hour.

Host Plants.—Tomato leaves can be easily infested artificially and *Nicandra physalodes* is believed to be a wild host plant. The major hosts are, however, potatoes and tobacco.

Various techniques for the comparison of the efficiency of different insecticides are being tried out, but as yet none have proved satisfactory.

Potato Aphids

The efficacy of various insecticides in the field is being examined. Those of particular promise are:

Thimet applied as granules at planting;
Menazon applied similarly and also as a tuber dip; and
Dimethoate applied as a spray.

It is hoped that the soil insecticides will provide good protection against aphids during the early (and possibly the most susceptible) stages of the crop. At the time of writing (six weeks after planting) very few aphids have been found.

Potato Pest Survey

A pest survey, mainly concerning aphids and potato tuber moth, was made on the major potato-producing farms of the Arcturus area on the 1963 second irrigated crop. Generally speaking the tuber moth infestation was light so there was little difficulty in control. One farmer strongly emphasized cultural control and had had success.

Barley Fly, *Hylemia arambourgi*

An experiment using various insecticides as seed treatments against barley fly was set up in early January, 1964. Later on plants were removed and an indication of the percentage infestation was determined.

Telodrin was found to be much the most effective of the five insecticides tested.

Scale Insects

An annotated check list of Rhodesian scale insects is being compiled. *Dactylopius confusus*, one of the species introduced into South Africa for prickly pear control is now widespread in Matabeleland where it attacks spineless cactus. A taxonomic study of the genus *Pulvinaria* is being made.

Locusts

The incidence of locusts in the recognized outbreak areas has remained low, due presumably to the continuing high water-table. The International Red Locust Control Service has now procured a helicopter for scouting and control work and this, supplemented by the fixed-wing aircraft already in operation, should greatly increase the efficiency of the service.

Biological Control of Noxious Weeds

Lantana camara

Little progress has been made. It was feared that the culture of *Teleonemia scrupulosa* at Salisbury had been destroyed by frost, but there are now signs of a recovery. There is no evidence of any natural spread of this insect, however, and no supplies of any of the other promising species have become available.

Salvinia auriculata

Political disturbances have so far prevented the proposed feeding tests with *Cyrtobagous singularis* in South America from being put into effect. No introductions have therefore yet been made.

Helminthology

Much of the nematological work has been in the preparation of material for study in the United States of America.

The nematologist was not satisfied with the apparent large losses which take place with the generally used sieving technique and has evolved a technique which appears to avoid this.

Observations were carried out on the populations of various genera of ectoparasitic nematodes on sugar cane at Chirundu. No conclusions have yet been reached from this survey.

Advisory Service

A total of 301 inquiries was recorded at the Salisbury office and during the one and seven months, respectively, that they were open, 15 at Mount Makulu and 111 at Umtali. These figures are all lower than last year's and reflect to some extent, staff shortages. The *Margarodes sp.* recorded last year at Triangle and Hippo on sugar cane again proved troublesome and an investigation on the spot in August showed that poor and debilitated cane was undoubtedly associated with high populations of this insect. Another scale insect of similar habits, *Odonaspis ruthae,* was frequently reported as a pest of lawn grasses. The scale insect *Coccus africanus* was reported from coffee in the Eastern Districts. Though known elsewhere in Africa this is the first record for Rhodesia. The termite *Cryptotermes brevis,* the dry wood termite, was found in a bookcase in Salisbury which had been imported from Cape Town. The examples found were dead but the precaution was taken of fumigating the flat in which the insects were found and there has been no recurrence. A very heavy infestation of the carpenter bee *Xylocope flavirufa* in the rafters of a Salisbury house was investigated. Some of the timbers were so badly affected as to require replacement. Defoliation of well-grown *Pinus patula* trees, 40 ft. high, on an Inyanga forestry estate proved to be due to an apterous grasshopper which is probably an undescribed species in the genus *Paralentula.* These occurred in thousands and, as so often happens with insects attacking pines they were wasteful feeders severing the needles at their bases. The ground below these trees was carpeted with the severed needles and the trees, as a result, lost must of their annual increment. A mite attacking apples at Inyanga was identified as *Bryobia rubricollis.* Besides the well-known weevils discussed above, *Analeurops cuthbertsoni* extensively damaged maize in one area, but was well controlled with Dieldrin, and severe damage was caused locally by *Protostrophus mucronatus.* An extraordinarily heavy infestation of a wide variety of crops by the cricket *Gryllus bimaculatus* was reported from the Kafue Polder in Zambia. A further extension of range of San Jose scale, *Quadraspidiotos perniciosus* from Selukwe, was reported.

Lectures

Full courses of lectures in agricultural entomology were given to the students at Chibero and Gwebi agricultural colleges. Lectures and demonstrations on underground maize pests, and on fruit and vegetable pests were given to organized courses for conservation officers. Numerous more informal lectures and talks were given to farmers' associations, garden clubs and the like.

Phytosanitary Services

Legislation

The Federal legislation was adapted and made applicable to Rhodesia by Rhodesia Government Notice 635 of 1963.

Quarantine

The plant quarantine house has been used for a variety of purposes including the growing of Australian pine grafts, Mexican potatoes and East European tobacco seed. The house is now being extensively modified to make it insect-proof and adaptably spore-proof where this is necessary.

Imports

The danger of importing blue mould of tobacco with tobacco samples was confirmed when a heavily infected sample was intercepted. This was destroyed immediately but no check on its viability was made. Subsequently imported samples have not been released to the importers but a room has been set aside for their examination after which they are destroyed by burning. An improvement in this system is planned for early development.

Several consignments of Cape apples were found to be infected with a mite, *Tetranychus* sp., at the blossom end. They were fumigated with hydrocyanic acid before release. Apples from Melsetter were found infested with *Hemiberlesia rapax* and were also fumigated before being distributed. Most interceptions were of a routine nature. They include one consignment of *Salvinia auriculata* and one of *Eichornia crassipes* destroyed in terms of the Noxious Weeds Act.

In addition to normal plant inspection duties the plant inspectors are now inspecting locally produced deciduous fruit for grading, seed potatoes for certification, fruit and vegetables for air export and dahlia growers' premises in respect of kromnek control.

The importations examined at the main ports of entry were very similar in amount to last year's, totalling 17,032 (17,590), consignments involving 1,297,015 (1,217,035) packages, last year's figures being given in brackets.

Permits issued for the import of plants totalled 538 compared with 669 last year. Phytosanitary certificates in respect of plants for export totalled 2,143. Inspections of large quantities of citrus fruit for export from Hippo Valley involving the issue of phytosanitary certificates by officers of the Department of Conservation and Extension, the issue of these certificates for tomato fruit exported to Moçambique and for consignments of tobacco passing through Moçambique has been the principal cause of the great increase over last year's total of 873.

The vacuum fumigation plant installed at Beira for fumigation of export tobacco has functioned, often to capacity, throughout the year. A report of incomplete kill of pests on one occasion was investigated and found to be almost certainly due to too low a dosage having been used. Higher dosages are now regularly in operation.

Nurseries

The number of nurseries registered in Rhodesia remained almost constant at 57. Most were inspected twice during the year. Again the level of hygiene was generally good and it was not necessary to impose quarantine restrictions on any. There were a few reports of unregistered premises selling nursery stock. These were investigated and the fault was generally found to be due to ignorance. Several of the sellers have subsequently registered.

Publications

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RESEARCH STATIONS

AGRICULTURAL EXPERIMENT STATION, SALISBURY

As so frequently happens, the rains which fell during the last ten days of October, d provided conditions ideal for the early planting of potato, velvet bean and some maize als, preceded a long dry spell that persisted throughout November and into December, iich month was also drier than normal. Goods rains fell in January and up to the 20th February, after which there was only one fall of any consequence. The total for the ason was 22.46 in., approximately 10 in. below normal. All trials which had to wait for itable planting weather until December, and these included groundnut and soya bean as ll as all the maize variety trials, had therefore only two and a half months during which e soil moisture was really optimum for growth; the drought in March coming just when ese crops were setting grain, was particularly serious. On the other hand, the favourable gh temperatures which lasted well into April were probably responsible for yields being high as they were in a season of such severe drought.

aize

The total sales of hybrid seed for planting in the 1963–64 season were the highest er—92,000 pockets. These sales included 800 pockets sent to London, 300 sent to the ongo, 203 to Tanganyika and 16,000 to Zambia. The greater part of this seed was of the rieties SR11 and SR13 but it included over 14,000 pockets of the single hybrid SR52 nich, for the first time, may have had a measurable effect on yields throughout the untry. At the time of writing this report, sales of seed for the 1964–65 season have topped 0,000 pockets, approximately half of which is of the variety SR52, and the demand for ed is so great that it has become necessary to import from South Africa to make good e shortage of Rhodesian hybrid seed. The value of this crop of maize seed is, at today's ices, nearer £600,000 than £500,000, and the seed industry assumes even greater importance.

Final figures for the 1963–64 Rhodesian maize crop are not yet available and the gure of 11.2 bags per acre, with a total European-grown maize crop of 4.4 million bags, the latest forecast available. Compared with the 3.4 bags per acre obtained in 1950–51, nother season of severe drought, this estimated yield is a good indication of the progress hich has been made in the last 14 or 15 years since hybrid seed was introduced, and nce nitrogen began to be used on any appreciable scale.

Varietal trials were conducted at 19 centres but four of these trials were failures, in ne case due entirely to the very severe drought. Except on research stations where a number f experimental hybrids are included, the number of varieties was limited to eight. The ean yields for these eight varieties are tabulated.

MEAN YIELDS OF GRAIN

(in bags of 200 lb. per acre)

Southern Cross 22·69	SR11 29·43	SR13 29·87	SR51 30·38	SR52 32·79	SR53 28·78	60H13 29·17	61DH6 31·17

Although SR52 has again given the highest mean yield, its superiority over the other ybrid varieties has been less marked in the short growing season experienced in most reas. The earlier maturing experimental hybrid 61DH6 performed very satisfactorily and ill be available to farmers as SR14 in the 1966–67 season. It will be recommended for rowing in the areas, and under the conditions, where SR11 is used today. This new hybrid as a greater degree of resistance to the leaf blight caused by the fungus *Helminthosporium urcicum* and is notable as the first hybrid to be released commercially having as one of its nbred parents a line developed from introduced material, in this case from Mexico.

Some years ago two sources of male sterility were obtained from the United States and oth were crossed with four local inbred lines. All four of the single crosses between Rhodesian inbreds and one of these sources proved male fertile, but similar crosses with he other source remained sterile and male sterile versions of each inbred were obtained y back-crossing. This work was not pressed forward because of the comparatively cheap

labour available for detasselling in crossing plots in this country and because of the co
plications involved in blending male fertile and male sterile seed in adequate proportic
to ensure that normal fertilization takes place in a commercial crop. The alternative meth
of restoring male fertility, by using a pollen parent carrying "restorer" genes, is now bei
investigated and, in the first instance, a number of lines are being tested to see wheth
they carry the necessary "restorer" genes. In any case, material with "the ability to resto
male fertility will be obtained and this character transferred to pollen parents such
SC5522, so that the use of "male sterile" lines can be adopted whenever they may
required.

The similarity of the comparative performance of hybrids when tested at Salisbury a
at other maize-producing centres indicates that hybrids developed here are equally w
adapted, or nearly so, to conditions in most parts of Rhodesia. However, there are exce
tions to this general rule and the lower part of the Mazoe Valley appears to be one. T
Sabi Valley is another. At present only those varieties which give the most promisi
results at Salisbury are tested on a wider basis throughout the country and it is possib
that amongst the discarded material are lines which would prove useful in a different e
vironment. Therefore at the Sabi a much wider range of material has been tested in to
cross combinations.

As varieties capable of higher yields are developed it is necessary to determine wheth
these higher yields necessitate changes in established agronomic practice and, in pursuan
of this objective, a population trial was conducted to determine the population requiremer
of the varieties in commercial use.

YIELDS OF GRAIN

(in bags of 200 lb. per acre)

Variety	*9,680*	*12,100*	*14,520*	*16,940*	*19,360*	*21,700*	*24,200*	*Season*
SR11	33.87	39.56	42.18	41.90	42.35			1961–2 & 1962–
			29.18	34.40	36.82	34.74	35.15	1963–4
SR52	40.45	45.63	51.49	51.37	57.14			1961–2 & 1962–
			32.70	34.10	35.23	36.40	34.74	1963–4
SR13	37.82	43.66	46.27	50.63	51.83			1961–2 & 1962–
			31.64	32.73	35.53	33.57	31.79	1963–4

Trials have been conducted over a long period of years to measure the direct and res
dual response of maize to nitrogen applied in a number of forms, at different stages in th
growth of the plant, and at various levels. The variety was the single hybrid N3233 x 457
and the population level 11,616 plants to the acre. Until 1960 the stover of the previou
crop was removed, but since then it has been ploughed back.

RESPONSE TO NITROGEN

(in bags of 200 lb. per acre)

Level of nitrogen applied	33⅓ lb.	66⅔ lb.	100 lb
Mean of seven seasons	+4.30	+2.25	+1.35
Mean of three seasons, stover of previous crop removed .	+4.40	+2.15	+1.12
Mean of four seasons, stover of previous crop ploughed under	+4.22	+2.33	+1.52
Residual response: Mean of six seasons	+0.24	+0.24	+0.46

The most important results from these trials can be summarized as follows:

(a) The form of nitrogen applied had no significant effect on the response.

(b) Applying the nitrogen in bands or broadcast had no significant effect on th
response to the nitrogen, both at planting and when top-dressed at a later stage

(c) On the heavy clay loam soil of the station nitrogen is generally more effective when
applied before, or at, planting but this factor depends on, and varies with, seasona
weather conditions. Top-dressing six weeks after planting was more effective tha
if delayed until the flowering stage.

(d) There were no significant interactions between form of nitrogen, time of application and method of application.

(e) In these trials, conducted on the second successive maize crop after leguminous green manure, the maximum economic application of nitrogen would appear to be approximately 80 lb., when nitrogen costs 1s. per lb. unit.

(f) The response to nitrogen is slightly greater when the stover from the previous maize crop is ploughed back.

(g) The residual nitrogen left over from applications to maize in the previous season varies considerably from year to year but is generally of little importance.

Following a leguminous crop which received no potash and was taken for hay, maize ponded to applications of potash to a notably greater extent than when it was grown the same land two years previously.

There was a greater response to potash in the presence of nitrogen and a greater response nitrogen in the presence of potash. The major response was to the first 50 lb. of K_2O.

YIELDS OF GRAIN

(in bags of 200 lb. per acre)

	oK_2O	50 lb. K_2O	100 lb. K_2O	Mean
o N	23.59	29.96	30.08	27.88
50 lb. N	21.94	33.79	34.11	29.95
100 lb. N	27.10	34.11	35.81	32.34
Mean	24.21	32.62	33.33	

Wheat

During the year under review there has been a notable increase in the interest shown this crop and in the work of the Wheat Breeder, and there is little doubt that the econo-c potential of irrigated winter wheat is becoming more generally appreciated. An increased mber of growers have achieved yields of over 15, and even over 20, bags an acre and ir results have stimulated still wider interest in the crop. A few growers in the marginal nfall areas continue experimental summer plantings on a considerable scale in the belief at profits from the crop may compare favourably with those from maize in areas where k of rainfall in the latter part of the season so frequently results in disappointing yields the latter.

In pursuance of the policy of maintaining in commercial use a number of varieties of ferent genetic origin, so that they are not all likely to be susceptible to any single new e of rust, seed of two more varieties is being released for bulking, one largely for summer d the other for winter production. The varieties available to farmers are:

For winter production	Mazoe
	S595A1A6B5 (New Release)
For summer production	S473B4A4
	S473B6
	S473C5A3 (New Release)
	Mazoe

S595 yielded 26.4 bags per acre in the 1964 winter trials and appears to be yielding er 30 bags per acre in a larger seed multiplication plot. The emphasis in the breeding ogramme now placed on a short, strong straw and resistance to lodging was reported t year, and it is pleasing to be able to say that S595, which has such straw, has proved pable of yields comparable with those from taller varieties. Two other varieties, developed m crosses with the Japanese dwarf material, have yielded 25.5 and 26 bags per acre. is likely that there will be many instances of high yields in this year's winter crop, but, the time of writing this report, harvesting is still in progress. These higher yields can be ributed to a number of factors, of which the most important was probably the excep-nally cold winter. It is possible, too, that the cold weather was the reason why no stem st was observed throughout the country on the winter crop.

Very difficult planting weather was responsible for poor stands in the 1963–64 summ crop, but prolific stooling compensated to some extent for the many blanks. In the yi trial Mazoe gave 10.28 bags per acre and was only surpassed by S473E6A1 with 11.30 ba per acre.

Barley

The total requirement of Rhodesian brewers is 15,000 bags of barley per annum, malting facilities they have being the limiting factor. They claim that it is uneconomic pay the present price of about 50s. for a 150 lb. bag of local barley and prefer to imp malt from South Africa rather than install additional malting equipment. In fact, it reported that 1964 acreage quotas were reduced because of some over-production in 19 probably due in the main to the application of larger amounts of fertilizer.

At the present prices of wheat and barley the higher yields possible from wheat ma it the more profitable of the two crops and, until higher yields are possible, barley p duction will have little attraction. Higher yields will necessitate the appication of heav amounts of fertilizer and, as with wheat, it is essential to have varieties with strong str so that they can make use of this fertilizer without lodging. Dwarf material for the bre ing of such varieties is available and work is in progress although the very limited requi ments do not warrant breeding on the same scale as for wheat.

Legumes

The two vacant plant breeder posts have been filled and both these officers are n working on this station. Mr. Tattersfield has only recently been transferred from Grassla Research Station but Mr. Meikle arrived from university in England in time for the f season.

As was to be expected, yields from most of the legume trials were lower than us but, considering the severity of the drought, were not without promise. A notable excepti was the velvet bean trial, from which yields were the highest for many years, advertis the reliability of this legume for forage and green manure purposes in all sorts of weath and seasons. Two varieties yielded over 16 bags an acre, whilst a further 12 varieties ceeded 14 bags.

Soya Beans

At the end of February, before any marked effect of the drought became visible, soya bean trials looked extremely well and promised very good yields. As in the case maize, where late varieties remain green longer and so are in better condition to make of any rain falling after a spell of drought, the slower maturing soya beans, such as Hernon varieties, seemed likely to respond to late rains to a greater extent than variet like Hill. But as no late rains arrived the quicker-maturing varieties gave the higher yiel seven varieties giving over 10 bags an acre in the replicated yield trial. Five of these w of South African origin.

Although a start was made on the breeding programme designed to develop variet suitable for mechanical harvesting and giving high yields of beans acceptable to the mark only a limited number of crosses were made and considerable time was spent in develop techniques. This year it will be possible to extend breeding work and a greatly increas number of crosses will be made in the coming season.

In addition to the trial at Salisbury, six varieties were compared in seven areas. T mean yields for all centres were as follows:

YIELDS OF GRAIN
(in bags of 200 lb. per acre)

Hernon 107	*Hernon 147*	*54S70*	*Geduld*	*Hood*	*Hill*
7.62	7.89	8.96	8.35	9.70	7.95

The quicker-maturing varieties gave the higher yields. It is considered that, becau the relative performance of varieties differs appreciably from season to season, to ass the value of varieties correctly they must be tested over a number of years. The seas under review was certainly atypical and favoured early varieties.

Groundnuts

The immediate objective of groundnut research on the station is to select and isolate most desirable types, on the basis of yield, disease-resistance and market requirements, m all the variable material which is available in the country today. Accordingly, it was ided to discontinue replicated yield trials for the time being and to grow a much wider ge of material in single observation plots. Selections will be grown in progeny rows and a later date the most promising of these selections will be compared more critically replicated trials. If satisfactory progress is not made in this way it will be necessary to iate a breeding programme.

A survey of material in all the African agricultural areas was conducted with the assis-ce of officers of the Department of Conservation and Extension and, as a result, not only fuller information available of the types of nuts being grown throughout the country, but collection on the station has been expanded considerably. Unfortunately, the obser-ion plots on the station suffered so severely in the drought that comparisons of varieties d selections may not be representative of their true potential under more normal condi-ns.

Field Beans

Eleven varieties were planted for comparison on the 2nd and 30th of January, but cause of the severe drought no crop was harvested from the latter planting and yields m the first were disappointingly low.

YIELDS OF DRY BEANS
(in bags of 200 lb. per acre)

Wades French	4.45	Top Crop	5.29
Canadian Wonder	4.33	Mondyne 34	3.66
White Haricot	4.22	La Favrita	3.24
Victory	4.17	Slender Green	2.77
Contender	4.06	Mondyne I	2.28
Sugar Bean	4.05		

Potatoes

The post of Potato Breeder was filled very shortly before the start of the season and this late date it was not possible to plan a full programme of work. Apart from the eeding programme, the Potato Breeder has initiated a scheme for the improvement of seed ocks of the most important varieties being grown in the country, that is Up-to-Date, alanga and, to a lesser extent, Pimpernel. The proposal is to maintain seed stocks of ese varieties by growing the potatoes at a high altitude on the Rhodes Inyanga Estate; lecting the outstanding plants each year for the following year's seed plot and releasing e rest to members of the Seed Potato Association. In the original instance, seed for the ot is being obtained by selecting high-yielding, virus-free plants from isolated fields from ich all virus-infected plants were rogued during the growing season. In the case of Up-to-ate and Walanga, selections have already been made. Within the seed plot those plants lected as foundation material for the following year will be individually tested to ensure ey are free from virus. It is hoped that this scheme will eventualy bring about a marked provement in the general standard of seed and provide a sound basis on which to build export market.

Following the October rains the potato fertilizer trial on the station was planted on h November, but very poor and uneven stands were obtained as a result of the very dry eather and yields were low.

CHIPINGA EXPERIMENT STATION

This is the most recently established research station in the Ministry of Agriculture. was formerly part of a demonstration farm administered by the Department of Con-rvation and Extension and is now operated as a horticultural experiment station with iority given to trials to establish whether or not such factors as shade, shelter, irrigation d mulch are important to the successful production of high-quality coffee in Rhodesia

The staff consists of an officer-in-charge and a technical assistant who also carries the duties of farm manager.

A new coffee factory, a coffee receiving tank and drying tables were completed in t to accommodate this season's crop of approximately 3½ tons.

The irrigation furrow was lined for 2,000 ft. on a neighbouring farm and two brid built enabling a servitude to be obtained.

A meteorological site was established and in addition to the routine observatio temperature readings are taken under and over mulch compared with the bare ground the mature coffee, and in a plot which has been shaded artificially with bamboo. Gro minimum temperatures are also taken at numerous sites on the station.

The routine weather recordings taken from March to September are presented in Ta 1.

TABLE 1.—CLIMATIC DATA, MARCH-SEPTEMBER, 1964

	March	*April*	*May*	*June*	*July*	*Aug.*	*Se*
Dry bulb . . .	70.7	65.0	60.6	56.8	54.3	57.6	6
Wet bulb . . .	66.7	61.2	57.1	51.2	50.9	53.7	6
Average maximum .	78.4	76.5	71.6	71.0	66.8	71.0	7
Absolute maximum .	86.1	86.0	78.8	80.5	75.0	81.3	9
Average minimum .	61.2	55.9	50.9	46.0	44.7	48.8	5
Absolute minimum .	57.9	49.0	45.5	31.5	37.7	41.5	4
Rainfall minimum .	2.81	0.86	1.00	0.00	0.85	3.20	C
Rain days . .	5	8	10	0	6	7	1
Evaporation minimum	5.95	5.05	4.04	3.64	3.36	4.28	6
Total run of winds (miles) . . .	1,985	2,071	2,010	1,937	2,168	2,295	2,69

Rainfall during the year was 36.8 in. compared with an average of 36.0 in. It v however poorly distributed. Temperatures were exceptionally low during the winter, fr being recorded once in the Stevenson screen and on several occasions on the grou particularly if it was mulched. A hail storm in August did considerable damage to younger wood in the coffee plantation.

Coffee

A coffee management trial which was started by the Department of Conservation 1960 was cropped this year for the first time. The six treatments are complete mul basin irrigation plus mulch and irrigation alone each with two levels of nitrogen (20 a 80 lb. N). There are fifteen trees in each plot and seven replications. Due to the risk over-bearing, half of the crop was stripped in January, but in spite of this very hea yields will be obtained, with some plots likely to exceed 25 cwt. of green coffee per ac

It is probable that the 50 per cent. thinning given in January was both too little a too late. Trees which had neither been mulched nor irrigated suffered badly from ov bearing. Picking was spread over a period of five months due to uneven flowering in 19 Flowering this year is again uneven which will again lead to an extended picking peri

A considerable amount of time was spent on a preliminary survey to assess the p centage of elephant beans in the various strains of coffee. It is thought that the develo ment of elephant beans is largely genetically controlled, although environmental fact are probably important in its expression. It has not been possible to examine the importa of environmental factors, although it is hoped to start work along these lines in the n future.

Variety trials, using the strains SL34, SL28, SL14, Ke20 and Blue Mountain, laid c as 49 single-tree plots, nave been yielded this year both on the station and on a neighbour farm.

In January three acres of coffee were planted and it is hoped to use this planting for shade trial. The trees were planted from an open ground nursery and the initial establishm was excellent. Unfortunately, due to the late planting, there was little growth before t

ter set in and a considerable amount of cold damage occurred resulting in plant losses. able material is however available for replacing the losses. It will be some time before ılts on the value of shading become available from this trial and so, to provide some liminary information, a 36-tree plot has been artificially shaded and detailed growth, d and temperature records are being taken.

Coffee seed of all strains was prepared and seed of the strains SL34 and SL28 will available to intending growers.

Other Crops

Liming, spacing, fumigation and fertilizer trials were carried out on peas this winter. owth was good and yields of over seven tons per acre were obtained from some plots. s hoped to repeat the liming trial next season.

A maize varietiy trial and a rate of nitrogen trial on Burley were successfully harvested. e yields on the maize trial were high, ranging from 47 bags per acre for the best variety 27 bags for the worst.

Twenty-five varieties of sugar cane were planted in August as an observational plot under gation to ascertain how it will react under Chipinga temperature conditions.

A variety trial of onions has grown well and yields should be good; the varieties tested re Dessex, Haemek, Egyptian Improved, Cape Flat and Texas Grano.

The citrus, guava and avocado orchards were maintained.

Leucaena glauca required for the shade trials was sown and 2,000 potted up in poly- ne containers.

Pinus patula and *P. Massoniana* were planted for shelter purposes around the station.

Pests and Diseases

Pests attacking coffee include leaf miner (*Leucoptera* sp.) and a stalk boring beetle *pate monachus F*). On newly planted coffee cockchafer grubs and sawfly larvae were ious and several Aldrin applications were necesary for control. Isolated outbreaks also curred of stinging caterpillars (*Parasa vivida*) and white waxy scale (*Ceroplastes* sp.).

The most serious disease, both in the mature coffee and the coffee nurseries, is *Cercos- ra coffeicola*. Considerable damage was caused to the berries, greatly lowering the quality the final product. *Rhizoctonia solani* did some damage in the nursery and *Colletotrichum osporoides* caused fruit dropping in the avocado orchard.

Advisory and Extension Work

A total of 74 advisory visits were made, mainly in the Melsetter area, where deciduous ıit growing is of considerable importance and is expanding. Considerable importance is ached to the carrying out of trials and demonstrations on farms and a trial was started the possibility of chemically thinning apples.

GATOOMA RESEARCH STATION

This report includes an account of the research work conducted at Gatooma by Mr. P. Turnstall and Mr. C. A. Matthews, entomologists of the Cotton Pest Research Scheme.

During the period 23rd May to 23rd June, Dr. Gillham visited Europe. In Rome he ended the joint F.A.O.—I.A.E.C. conference on the uses of induced mutations in plant eeding. He also visited the Institut de Recherches du Coton et des Textiles Exotique in ris and several research organizations in England, including the Silk and Man-made Fibres esearch Association, Manchester, for discussion on matters relevant to the cotton research ogramme at Gatooma.

As a result of the generosity of the Rhodesian Cotton Growers' Association in pro- ding money for research from cotton levy funds, a small but adequate irrigation unit ıs installed during the year. Other recent gifts to research from cotton levy funds have cluded a Micronaire, Sauter-Monopan balance and Nep Test machine for the fibre labora- ry; a John Deer four-row 494A planter and a Hagic Crop Spray machine; and funds defray the costs of spinning tests at the Shirley Institute, Didsbury, England, on a number lint samples from the cotton plant breeding trials.

Total rainfall at the Gatooma Station, from the 1st October, 1963, to the 30th Ap 1964, ranged between 18 and 20 in. from three different gauges and was thus one of lowest of rainfall seasons since records were started in 1925–26.

The late start to the season and the early termination of the rains resulted in relatively low yields of mostly between 900 and 1,200 lb. seed cotton per acre, compa with 2,000 to 2,500 lb. seed cotton per acre in the previous season.

In contrast with the general run of yields from the dryland crop, yields of 1,500 2,000 lb. seed cotton per acre were obtained from the earlier date of planting treatme sown with irrigation on 2nd November.

The country's commercial crop was grown on approximately 12,000 acres, from wh an estimated mean yield of 1,240 lb. of seed cotton per acre was obtained. Compara figures for the previous season were 6,000 acres with a mean yield of 1,340 lb. seed cot per acre.

The total number of bales of 400 lb. lint ginned in 1964 was 12.555, compared w 7,130 bales in 1963. Class A cotton accounted for 84.4 per cent., Class B for 13.3 per ce and Class C for 2.3 per cent.

The 1963–64 crop of 12,555 bales represents a production record since the time wh commercial cotton growing first commenced in Rhodesia in 1923–24.

Acid delinted cotton seed sufficient to sow at least 50,000 acres of cotton in 1964 has been supplied to growers by the Cotton Marketing Committee.

Cotton Insect Pest Control

An investigation of the sex attractant in *Diparopsis* (red bollworm) has been started conjunction with the Tropical Products Institute, London, who will be primarily concer with the chemical aspects of the investigation. The present season's work was essentia of a preliminary nature and consisted of investigating methods of pupal collection, extracti techniques, trap design and techniques for testing attractants. This programme of wo will be expanded and continued in 1964–65 in preparation for a large-scale pupal collecti in the following season, 1965–66, with the object of obtaining sufficient sex attractant allow a chemical analysis to be made.

Further work on ovipositional response of *Heliothis* (American bollworm), indicat that under a high infestation pressure, in the field, the glabrous varieties are as heav attacked by *Heliothis* as are pubescent varieties. Also, although in previous experime *Diparopsis* had shown no ovipositional response to the varieties under test, it was surprisi to record a significantly lower egg count on the two glabrous compared with the pubesce varieties.

Aerial spraying with a helicopter, a Hiller UH/12E. was studied throughout the seas for the first time, and with the assistance of Mr. D. R. Johnstone of the Tropical Pesticid Research Unit, Porton, England, detailed assessments of the swath-width spray pattern a spray deposits on cotton plants 8, 16, 33 and 44 in. high were carried out. In the fie trials, the yield was on average 139 lb. seed cotton per acre higher on the plots spray with tractor-mounted equipment compared with the helicopter sprayed plots, with a me yield of 963 lb. seed cotton per acre.

The timing of spray applications was investigated in relation to different levels bollworm egg counts. Delay in changing from Carbaryl to DDT for *Heliothis* until the were half, one or two eggs per plant resulted in progressively greater losses of yield an thus, a corresponding loss in profit. The recommended spray treatment gave a yield 1,456 lb. seed cotton per acre. In a season of low rainfall where loss of the early form bolls was not compensated by a late crop, the importance of controlling a light infestati of *Heliothis* is emphasized.

A trial comparing Carbaryl, DDT and Endosulfan showed that Carbaryl genera controlled *Diparopsis* very effectively, but where DDT emulsion sprays were applied f *Heliothis,* there were more *Diparopsis* larvae than when DDT 75W micronized wettab powder was used. A reduction in the concentration of DDT from 0.5 per cent. reduc

control of *Heliothis* and a reduction in the concentration of Endosulfan below 0.5 per nt. reduced the control of both *Diparopsis* and *Heliothis*. Mixtures of Carbaryl and DT need further examination in seasons of greater rainfall and insect attack, but it is ought that the use of Carbaryl at 0.25 per cent. active ingredient with DDT at 0.5 per nt. active ingredient during a *Heliothis* attack will give better control of *Diparopsis* and *rias*. If the *Heliothis* attack is predominantly in March, improved control of *Deparopsis* this stage will result in fewer diapause or over-wintering pupae being formed, and thus e number of pupae which could infest the following season's crop woud be reduced.

In other trials the following main results were obtained: the importance of good spray verage was demonstrated; the use of fumigants gave no significant increase in yield; and e bacterial insecticide based on *Bacillus thuringiensis* did not control the insect pests of tton in Rhodesia.

An extension trial confirmed that a 75 per cent. micronized wettable powder formula- n of DDT was equally as efficient as a 25 per cent. emulsifiable concentrate formula- n and gave an increased profit margin as a result of its lower price. A yield level of proximately 1,300 lb. seed cotton per acre was obtained at Gatooma. The wettable powder rmulation has the added advantage in that it is compatible with the wettable powder rmulation of Carbaryl, and these two insecticides can individually be distributed to peasant rmers in the form of polyethylene packs containing sufficient insecticide for one knap- ck filled with liquid.

Cotton Plant Breeding

Preliminary variety trials were conducted at Gatooma and Chisumbanje. At both cations, a number of introduced varieties out-yielded the local varieties and had a sig- ficantly higher ginning out-turn. The best of these are to be used in a series of test crosses ith Albar to determine which will be the most suitable in the breeding programme. The mitation on these varieties is likely to be lint quality.

District variety trials were conducted at nine locations in Rhodesia and at six locations Zambia. At the time of writing, only the data from the Rhodesian trials are available. he mean lint yield in lb. per acre were: Bindura 439, Gatooma 257, Mazoe 896, Mtoko 14, Nyanyadzi 1,174, Sabi Valley Experiment Station 1,369, Triangle 1,187, Umshandige 25 and Umtali 696. The variation in fibre characters was a striking feature of these trials. he staple lengths in 32nds of an inch and the micronaire values (fineness/maturity) for the cations, averaged over all varieties, were as follows: Bindura 31.4, 2.94; Gatooma 30.2, 78; Mazoe 32.6, 3.73; Mtoko 31.0, 4.00; Nyanyadzi 34.0, 4.39; Sabi Valley 36.0, 4.13; riangle 35.0, 4.08; Umshandige 31.0, 4.74 and Umtali 33.0, 3.40. The trials at Nyanyadzi, abi Valley and Triangle, all situated in the lowveld, received irrigation. The remaining ials were in the middleveld. The very big differences in length and fineness/maturity between ie three trials at locations in the lowveld and between the six trials in the middleveld, s well as between trials in the two distinct areas demonstrate very clearly the need to in the commercial crop in subdivisions which will prevent mixing of lint differing in ie major characters.

The inter-territorial variety trials were conducted for the first time at Gatooma, Sabi alley, Mount Makulu in Zambia and Makanga in Malawi. They were also conducted at everal locations in the Republic of South Africa, but only data from the four mentioned re presented. The mean yields of lint in lb. per acre were: Gatooma 253, Sabi Valley 713, Makanga 315 and Mount Makulu 717. Fibre data are not available at the time of writing. With African varieties of cotton, a drop in ginning out-turn is expected at Makanga and n the Sabi Valley. In these trials, the Acala varieties were able to maintain the same level f ginning out-turn at all locations without any loss of seed weight. All other varieties howed the expected drop in ginning out-turn at both locations.

Cotton Agronomy

Unless stated to the contrary, Albar 637 acid delinted seed was planted in the cotton gronomy trials, nitrogen fertilizer applications refer to calcium ammonium nitrate, phos-

phorus applications to single superphosphate, potassium applications to muriate of potash a plant spacing of 3 ft. x 6 in. was used as standard.

In Spacing Trial I, with between row spacing of 2 ft. 6 in., 3 ft. 6 in. and in-r spacing of 6 in., 12 in., 18 in. each with one plant per station, the mean yield of the tr was 1,123 lb. seed cotton per acre. There was a general tendency towards higher yie from closer spacings, i.e. higher plant populations. However, only in-row spacing had a real effect upon yield, the response being linear and significant at the 5 per cent. lev The following yields are relevant:

In-row Spacing:	6 in.	12 in.	18 in.
Yield lb. seed cotton per acre:	1,211.2	1,086.1	1,074.4
L.S.Ds.:	5 per cent. = 113.4;	1 per cent. = 156.2	

Ginning out-turn (G.O.T.) as a mean over the first and second pickings and mean bo weights over the first picking were not affected significantly by spacing.

In Spacing Trial II, with between-row spacings of 1 ft. 6 in., 2 ft. 6 in., 3 ft. 6 in. a in-row spacing of 3 in., 6 in., 9 in. each with one plant per station, the mean yield of t trial was 1,135 lb. seed cotton per acre. It would appear from an inspection of the da that the 3 in. in-row spacing and the 1 ft. 6 in. between-row spacing have gone beyon the optimum spacings necessary for best results, as yield has been depressed at these ve close spacings.

Closer between-row pacings resulted in a highly significant increase in G.O.T. (linea P = 0.01). However, there was a significant interaction which indicated that, for th character, by increasing in-row spacing there was a decreased response to between-row spa ing. The following results relate to between-row spacings and G.O.T.s taken on means the first and second pickings:

Between-row Spacings:	1 ft. 6 in.	2 ft. 6 in.	3 ft. 6 in.
Ginning Out-turns (G.O.Ts.):	34.6	34.2	33.6
L.S.Ds.:	5 per cent. = 0.38;	1 per cent. = 0.52	

Again, the widest between-row spacing produced heavier boll weights (taken on the fir picking only). This result was significant at the 5 per cent. level (linear, P = 0.5).

Between-row Spacings:	1 ft. 6 in.	2 ft. 6 in.	3 ft. 6 in.
Mean Boll Weights, in grms.:	3.72	3.72	4.10
L.S.Ds.:	5 per cent. = 0.32;	1 per cent. = 0.44	

In the nitrogen x population x time-of-planting trial with treatment levels—nitroge 0, 40, 80 lb. acre; populations: plant stands of 45, 65, and 85 per cent., created at a fina thinning at 4-5 weeks after germination; dates of planting: 21st November, 6th Decembe and 20th December, the mean yield of the trial was 909 lb. seed cotton per acre. Only th time of planting treatments resulted in any significant difference in the yield of seed cotto Delayed time-of-planting decreased yields by 306.3 ± 152.6 lb. seed cotton per acre on th average, for each successive delay of 15 days after 21st November.

In the nitrogen x phosphorus x potash trial with treatment levels—nitrogen: 0, 45, 90 phosphorus: 0, 40, 80; and potassium 0, 30, 60; there was a significant response of 164.7 ± 10.9 lb. of seed cotton per 30 lb. of K_2O per acre applied. No other treatment prove significant. On analysis the initial K_2O status in the soil was described as "deficient", th initial nitrogen status was described as "low to medium", while phosphate was "deficient"

In the lime x nitrogen x phosphorus trial with treatments—lime, 0 and 4 tons per acre nitrogen 0 and 45 lb. per acre and phosphorus 0 and 70 lb. per acre, there were no significan effects upon yield due to any treatment.

The nitrogen x time-of-planting x spacing trial was a 2^n design of an exploratory natur and had the following treatments—nitrogen: 0 and 85 lb. per acre; dates of planting: 2nd November, 30th November; spacing treatments: 3 ft. x 6 in. and 3 ft. 6 in. x 12 in. The tria was germinated by sprinkler irrigation, but no further supplementary irrigation was applied Delaying the time-of-planting from the 2nd November to the 30th November significantly reduced yields by ± 853.5 lb. seed cotton per acre. There was also a significant response

o 85 lb. N per acre of ± 152.4 lb. seed cotton per acre compared with no nitrogen. Furthermore, the nitrogen x time-of-planting interaction also proved significant, indicating that the later planted, 30th November, cotton did not respond to nitrogen at the rate of 5 lb. N per acre. Finally, time-of-planting and spacing had highly significant effects on boll weight.

The nitrogen x phosphorus trial (Netherburn Farm) with treatments—nitrogen: 0, 40, 80 lb. per acre; and phosphorus: 0, 40, 80 lb. per acre, gave a mean yield of 1,114 lb. seed cotton per acre. Only phosphorus produced an overall increase in yield which proved to be significant. The quadratic nature of the response was not significant.

P_2O_5 nutrient lb. per acre	0	40	80
Yield lb. seed cotton per acre . . .	1,001.0	1,202.4	1,139.9

While the response to phosphorus was not surprising, because the initial status was described as "deficient", the response to nitrogen was disappointing, the initial status being described as "medium".

In a herbicide trial the four pre-emergence herbicides, Ametryne, Prometryne, Dacthal W-15 and Karnex were applied at the time of planting the cotton on 8th and 11th December on two different sites on the station. From observation neither cotton plant growth nor yields were adversely affected in the treated plots when these were compared with control.

The control of the grasses *Eleusine indica* and *Rottboellia exaltata* was quite effective when considered as a whole, Ametryne and Prometryne showing slightly more promise. In regard to broad-leafed weeds only Dacthal W-15 was disappointing, particularly in its control of *Bidens pilosa.*

Because of the promising first results obtained, it is planned to expand the work with herbicides.

Three spacing, two fertilizer and one fertilizer x spacing trials were designed at Gatooma for the Conservation and Extension Department who planted and supervised the trials in different farming areas. Subsequently, yield data from the trials were analysed at Gatooma for the Department who will report the results.

Trials with Crops other than Cotton

In a soya bean variety trial with 36 varieties the mean yield was 7.5 (200 lb.) bags per acre. The following five varieties gave the highest yields, but did not differ significantly at the 1 per cent. level. Hood, 12.9 bags; Salisbury 59S/143, 12.1 bags; Salisbury 568/30, 11.6 bags; Hill, 11.0 bags; Geduld, 10.5 bags. Late maturing varieties did not do well in the "short" rainfall season.

A soya bean variety x spacing trial was held with three varieties, Hill, Columbia M8A, and Australian Mamloxi (which differ considerably in growth habit and time of maturity), and the following spacings: between-rows 18 in., 24 in., 30 in.; in-rows 1 in., 3 in., 5 in. The mean yield was 8 bags per acre. Yield differences between spacing treatments were not statistically significant, but differences between varieties were highly significant.

Varieties:	Hill	Columbia M8A	Australian Mamloxi
Yields, 200 lb. bags per acre:	10.38	9.24	4.50
L.S.Ds.:	5 per cent. = 1.31;		1 per cent. = 1.78

In a castor bean variety trial nine varieties all of *medium* growth habit were compared. The mean yield of the trial was 1,050 lb. per acre of decorticated bean. The following four varieties were the highest yielders but differences were not significant at the 1 per cent. level: H55, 1,341 lb.; Pacific Hybrid 192, 1,290 lb.; H1, 1,240 lb.; Pacific Hybrid 243, 1,094 lb.

In a castor bean variety trial in which four *dwarf* varieties were compared statistically, significant differences between varieties were obtained.

Varieties:	D25	Gnomda	D301	D2
Yields lb. per acre:	1,570	1,194	1,018	734
L.S.Ds.:	5 per cent. = 290;		1 per cent. = 416	

Mean yields in the castor bean trials, of approximately 1,100 lb. per acre, were disappointing compared with the 2,200 to 2,600 lb. per acre obtained from the trials in the previous season, and the difference may be due to the greater number of applications of DDT against insect pests, which were made in 1962–63. Critical work on the control of pests is not being undertaken at Gatooma.

The following trials were planted at Gatooma for other research stations, results of which are reported by the stations concerned:

National soya bean rhizobium trial for Grasslands Research Station.
A groundnut variety trial for Salisbury Experiment Station.
A sorghum variety trial for Matopos Research Station.
A maize variety trial for Matopos Research Station.

Publications

Gillham, F. E. M., "Evolutionary Significance of Glands and their Importance in Cultivated Cotton". Accepted for publication in the *Empire Cotton Growing Corporation Review*.

Gillham, F. E. M., "Cotton Breeding in Southern Rhodesia, I. An Outline of Aims and Design". Presented at the Department of Research and Specialist Services Agronomists Conference, February, 1964. Submitted for publication in the *Rhod. Agric. Jnl.*

Tunstall, J. P. and Matthews, G. A., "Large-scale Spraying Trials for the Control of Cotton Insect Pests in Central Africa". Submitted for publication.

Tunstall, J. P. and Matthews, G. A., "Contamination Hazards using Knapsack Sprayers for Cotton Insect Control". Accepted for publication in the *Empire Cotton Growing Corporation Review*.

Tunstall, J. P., Matthews, G. A. and Rhodes, A. A. K., "The Development of Cotton Spraying Equipment in Central Africa". Accepted for publication in the *Empire Cotton Growing Corporation Review*.

Johnstone, D. R. and Matthews, G. A., "Tests to Determine the Swath Pattern and Spray Droplet Size Provided by a Boom and Nozzle Installation Fitted to a Hiller UH/12E Helicopter". Tropical Pests Research Unit, Porton, England. Porton Report No. 279.

Johnstone, D. R. and Matthews, G. A., "Compartive Assessment of Dosage Distributions in Cotton Resulting from Helicopter and Ground Spray Treatments". Tropical Pests Research Unit, Porton, England. Porton Report No. 280.

GRASSLANDS RESEARCH STATION
(including Eastern Highlands Research Station)

Notable features of the year have been the release of three new pasture grasses, the formal opening of the Soil Fertility Laboratory built on the station by the Agricultural Research Council, the completion of the station's temperature-controlled glasshouse, the high yields of groundnuts obtained in an adverse season, the beef field day held on 12th August, and, of course, the drought. Rainfall for the past season, at 18.56 in., was almost the lowest on the station's records.

Some 1,150 visitors were recorded during the year. There were, however, fewer African visitors than usual.

From an experimental point of view the season has been both salutary and encouraging—it has been a salutary reminder of the vagaries of the Rhodesian climate, and an encouraging demonstration of their mitigation by good farming based on research.

Generous gifts of fertilizers were received from Messrs. Fisons (Rhodesia) Ltd., Messrs. Windmill Fertilizers (Rhodesia) Ltd., and Messrs. African Explosives and Chemical Industries (Rhodesia) Ltd.

Livestock

Seventeen experiments with livestock were conducted during the year, mainly on the use of local feeds for beef cattle, dairy cattle, and sheep. Some work on internal parasites and their control was also done.

Beef Cattle

With beef cattle the main outcome of the year's work is a much clearer appreciation of priorities in giving supplementary feeds to grazing animals. It has always been known that grazings have their shortcomings in the dry season, but what has only just become clear is that they have their shortcomings during the rainy season as well. The order of priority, therefore, in using supplementary feeds is, first, to maintain weight during the dry season, second, to increase growth during the rainy season, and last, to increase growth during the dry season.

In experiments in fattening animals for slaughter in January and February, it has been shown again that three-year-old steers on burned veld grazing can be well finished by feeding them each 2 lb. of crushed maize daily from the beginning of October.

Two of the newer worm remedies, Haloxon and Thiabendazole, have been found to be more efficient than the commonly used Phenothiazine for controlling internal parasites, and more work is going on to distinguish between the various parasites concerned. The station has continued to help the tick mission of the Food and Agricultural Organization of the United Nations with its study of ticks in Rhodesia.

Experiments have been started to find how the veld may be used more intensively for beef production, to find how to use protein feeds more efficiently in winter, and to find how best to produce baby beef with local feeds.

Dairy Cattle

In reassessing the value of planted pastures for producing milk, it has been found that cows grazing moderately fertilized Starr grass (80 lb. of N/acre/season) will produce as much milk when fed a supplement of maize meal, which contains 8 per cent. of protein, as when fed supplements containing 16 per cent. and 24 per cent. of protein.

In feeding dairy heifers it has been found once again that they make very satisfactory growth in winter if put to graze on maize stover and given 20 lb. of grass silage a day each.

Sheep

With sheep it has been shown that Haloxon and Thiabendazole will control mature intestinal worms, and, now that an officer has been trained for the purpose, their efficacy in controlling immature worms is being assessed.

Studies of effects of cross-breeding on carcass conformation have been started.

Rhizobium

In the Rhizobium Laboratory selection of efficient strains of rhizobium for use with the more important legumes was continued, and strains of soya beans, groundnuts, lucerne, peas, beans, lupins, and certain promising pasture legumes were dealt with during the course of the year.

With three legumes, namely soya beans, lucerne and peas, the best strains of rhizobium for greenhouse tests were tried in the field. In the case of soya beans a national trial to test seven strains at eight stations in the two Rhodesias was organized. In some cases in this trial no apparent benefit was gained by inoculation, but in others there was substantial benefit, as is clear from the yields, from the Sabi Valley Station, of soya bean hay and grain given in the table at the end of the paragraph. The yields of lucerne shown were secured from five cuts taken during the eight months following planting. All four crops were grown under irrigation.

Crops (all irrigated)	*Yield in lb. D.M./acre*	
	Seed uninoculated	*Seed inoculated*
Soya bean hay	4,860	10,220
Soya bean grain	1,300	3,170
Lucerne hay	2,300	10,300
Ripe pea grain	690	3,000

The culture collection, the basis of the laboratory's work, contained 635 strains of rhizobium from 230 species of legumes at the end of the year. Some 220 of these strains

have been imported from similar laboratories in other parts of the world and the remainder have been gathered locally.

During the course of the year the laboratory and the culture factory issued 630 cultures for experimental purposes; 120 of them were sent to other countries.

Pastures

The work of developing pastures for use in the high-rainfall-sandveld and the search for grasses and legumes for the purpose were continued as usual, with 12 experiments being done.

Some 140 grasses are being screened in the search for productive, leafy, free-seeding nematode-resistant grasses that will withstand intensive use during the rainy season. As the first fruits of this programme, started in 1960, three grasses, namely Muguga Star grass, Beehive Paspalum, and Wintergreen Paspalum, were released. More intense study of the culture of these and several other promising grasses was started.

Some 115 legumes have been grown for consideration as pasture legumes, and 10 of them have been selected for further test. They are: *Lotononis bainesii, Trifolium semipilosum, Stylosanthes guayanensis, Stylosanthes mucronata, Dolichos formosus, Lablab niger, Desmodium intortum, Desmodium discolor, Medicago sativa,* and *Listia herterophylla.* Studies of the culture of the first of these, and studies of growing several of them with grasses, have been started.

With the help of the Tobacco Research Board strains of *Lotononis bainesii* more or less resistant to rootknot eelworm, and strains of *Trifolium semipilosum* tolerant of it, have been found.

Row Crops

The study of row crops that are, or may become, important in the high-rainfall sandveld was continued, 16 experiments being done in all.

Maize

In a routine test of maize hybrids for the Salisbury Experiment Station the single hybrid sold as SR51 yielded 35 bags an acre, despite the dearth of rain.

Where maize was grown on virgin sandveld soil it grew well only where sulphur was added—even with lavish quantities of other fertilizers it grew poorly in the absence of sulphur. On the other hand, on land cropped for some years (where sulphur has been added as an ingredient of other fertilizers), no such effect was seen.

Groundnuts

In groundnut variety trials 15 of the best of the varieties selected over the years yielded more than 2,500 lb. of kernels an acre—a most encouraging performance in a difficult season.

Experiments with planting density have shown again that the optimum lies between 120,000 and 140,000 plants per acre.

Two herbicides, namely Ametryne and 2,4-D, have been selected as meriting further trial for controlling weeds in groundnuts.

Soya Beans

Some 240 varieties of soya beans were grown for obesrvation, and the best 30 from previous tests were compared for their yield of hay and grain. Yields, because of the shortness of the wet season, were generally small, and the advantage, in such a season, of quickness-of-maturity was clearly shown—hay yield was less by 34 lb. per acre for each extra day taken to reach the flowering stage and grain yield by 52 lb. per acre. The advantage of early planting was also shown with great force.

Testing of strains of rhizobium for soya beans has been mentioned already under the heading "Rhizobium".

Lucerne

In studies of the culture of irrigated lucerne it was found that compost and borax were useful in increasing yield, that yield was greater with the crop grown in 10 in. rows

han with wider row spacings, and that 6 lb. of viable seed per acre produced a crop iving as great a yield as that from any larger quantity of seed.

Testing of strains of rhizobium for lucerne has been mentioned already under the ieading "Rhizobium".

Soil Productivity

Four experiments to find the effects of various practices on subsequent soil productivity vere continued during the year.

In an experiment in which *Sabi Panicum* has been grown for hay for four years it vas found, with the second test-crop of maize after ploughing the grass, that residual effects of the treatment of the grass were similar to, but smaller than, those seen with the first est-crop of maize. That is to say, it was found that the yield of maize was lower where he grass had been grown in 3 ft. rows than it was where it had been grown as a close stand—the reverse of the effect on the yield of the grass itself. It was also found that the yield of maize was somewhat lower where the grass had been heavily fertilized with nitrogen than it was where it had been lightly fertilized—again the reverse of the effect on the grass itself. There is, therefore, for the second season running, a suggestion that something was depleted that had not been taken into account.

In an attempt to find clues to the cause of the immobilization of nitrogen under grass leys a stand of *Sabi Panicum* is being interfered with in various ways. Last year root-pruning drastically reduced yields, but this has had no apparent residual effect this year. On the other hand, large dressings of compost applied three years ago are still causing substantial increases in yield, and this whether or not nitrogen fertilizer is applied.

The Veld

Five experiments comprising studies of stocking rate, effects of burning, effects of grazing, and methods of killing coppice have been continued or started during the year.

As a tribute to the tenacity-of-life of Msasa and Mnondo coppice, it is noteworthy that it has withstood slashing to the ground three times a year for three years with very little loss of vigour.

Station Crops and Livestock

In the station's arable rotation there were 260 acres of planted grassland, 47 acres of maize, 37 acres of soya beans, 20 acres of millet, 70 acres of labourers' allotments, and 128 acres of fallow land. In addition there were 26 acres of irrigated forage crops. Some 850 bags of maize were reaped, and 960 tons of silage and 90 tons of hay of various kinds were made. Sixty acres of pasture and 12 acres of trees were planted, but the trees failed in the drought.

The station's flocks and herds comprised 591 beef cattle, 106 dairy cattle, and 192 sheep at the end of the year. During the year 150 steers were bought and 152 were sold on grazier's agreements with the Cold Storage Commission.

The average output of milk from the station's Friesland dairy herd for all 300-day lactations completed during the year was 10,450 lb., with a fat content of 3.65 per cent.

Eastern Highlands Experiment Station, Melsetter

The policy and programme of the Eastern Highlands Experiment Station, which was returned to the care of Grasslands in May, 1963, were revised during the course of the year.

The rainfall of 22.63 in. was the lowest ever recorded on the station and this, following the premature tailing off of the erratically distributed rainfall has left all grazing in a poor state.

Livestock

With rainfall so far this year approximately 40 per cent. down on the 14-year average, the growth of animals and the regrowth of all grazing has been considerably poorer than expected. In earlier trials steers grazing unsupplemented dahl/napier foggage have recorded the best winter weight gains, but indications this year are that animals on the same treat-

ment will only be able to maintain their entry weights. In the veld grazing trial, the animal last winter (1963) lost only about half the weight, the same beasts have lost so far thi season.

Beef

Two lines of investigations have been pursued, beef production from improved plantec pastures and beef production from natural veld.

Pasture Beef

In August, 1963, 30 Hereford weaners arrived with an average weight of 400 lb. These steers, since their treatments started, have been kept exclusively on pastures and conservec feed. Their summer treatments were: I, control; II, 1 lb. maize meal + 2 lb. cotton seed; III, 2 lb. maize meal + 1 lb. cotton seed; IV, 3 lb. maize meal, while they were grazing 20 acres of kikuyu/clover pasture. During the winter period all groups have had access to napier fodder, dahl, hay, molasses, swedes and napier silage, with the 15 steers in groups II, III and IV receiving 1 lb. cotton seed per head per day. Because of the false start of the rains the grazing of the allotted pastures did not begin until 29th December, but the feeding of the mixed supplementation started on 26th November, both in anticipation of the rains and to accustom the steers to their individually fed ration. Their first summer period with proper trial feeding thus lasted from 29th December, 1963, till 1st May, 1964, when they went on to winter treatment, as described above, which they are still receiving.

Group Treatment	*Av. wt. 7.1.64*	*Av. wt. 28.4.64*	*Incr.*	*No. days*	*Incr. p/h p/d*
I	525	730	205	112	1.83
II	527	781	254	112	2.27
III	528	781	253	112	2.26
IV	518	777	259	112	2.31

Winter supplementation (1 lb. cotton seed per head per day for II, III and IV), started on the 28th April and on the 29th September the following weight increases had been recorded:

Group Treatment (summer)	*Av. wt. 28.4.64*	*Av. wt. 19.9.64*	*Incr.*	*No. days*	*Incr. p/h p/d*
I	730	733	3	154	.02
II	781	792	11	154	.07
III	781	806	25	154	.16
IV	777	782	5	154	.03

Groups have been kept separate in the above table to allow any differences to be easily associated with summer treatments.

The average weight gains recorded for all groups are disappointing; in particular the performance of the control group falls far short of the gain of just under one pound per head per day of the comparable group on a similar treatment during the winter, 1963.

As with the mixed supplementation during the summer the feeding of protein during the winter was also disappointing; however, although these steers' weight gains have not been at all good, no overall weight loss has occurred.

VELD BEEF

Three camps, each of five steers, were stocked in December, 1962, at grazing pressures of 6, 10 and 14 acres to the beast, to test the carrying capacity of the Melsetter veld. Protein, 2 lb. coton seed per head per day, is fed during the winter, and, due to the late onset of the rains in 1963, was given until 17th December.

Summer weight gains are given below, from the 17th December:

Stocking rate	*Av. wt. 17.12.63*	*Av. wt. 5.5.64*	*Incr.*	*No. days*	*Incr. p/h p/d*
6 : 1	791	956	165	140	1.18
10 : 1	733	884	151	140	1.08
14 : 1	784	937	153	140	1.09

Winter weight losses were as folows:

Stocking rate	*Av. wt. 5.5.64*	*Av. wt. 22.9.64*	*Loss*	*No. days*	*Loss p/h p/d*
6 : 1	956	878	78	140	.56
10 : 1	884	826	58	140	.41
14 : 1	937	870	67	140	.48

It is worthy of note, that although the greatest winter weight loss occurred in the camp with the highest stocking rate, the average liveweight increase of this camp during the summer was the best of the three different rates and compares favourably with the pasture beef control group.

Pasture Beef. Summer Maize Supplementation Trial Completed

The remaining two-year-old steers from the earlier summer and winter pasture trials were regrouped into two groups each of 12 steers early in November. From the 5th November, when Group A's average weight was 786 lb. and B's 792 lb., they were fed 2 lb. and 4 lb. maize meal respectively and grazed 16 acres of summer pastures and later foggage. By the beginning of March the 12 heaviest animals were ready for slaughter and six from each group were killed on 4th of March. The average value at slaughter for groups A and B was £43 12s. 6d. and £43 6s. 8½d., with feed costs from 1st January until their departure from the station of £1 10s. 10d. and £3 1s. 8d. The average cold dead weight for the two groups were 561 and 559 lb. The animals lacked finish and their grades of two each in the R.B., Imp. and Std. A classes for Group A, and one R.B., one Imp. and two Std. A for Group B were disappointing; the hoped-for advantage of Group B over Group A did not materialize.

The remaining 11 animals (one died) were slaughtered on 1st June and were weighed for the last time on 30th May. The average value at slaughter for groups A and B was £42 10s. 6d. and £41 18s. 10d., with feed costs from 1st January to 31st May being £4 3s. 7d. and £8 7s. 2½d. Average cold dead weight for the two groups were 562 and 560 lb. All animals in Group A and three in Group B graded R.B. with the remaining Imp. Although no firm conclusions can be drawn from these results, Group A on 2 lb. maize meal does seem to have performed a little better than Group B on 4 lb. maize meal per head per day.

Sheep

A small group of ewes started lambing towards the end of 1963 and by the end of November 18 live lambs had been born. The average birth weight was 9.9 lb., the heaviest lamb weighing over 13 lb. Selected progeny are being kept to provide a build-up in flock numbers; these were swelled in January by the arrival of 88 ewes and three rams from Chipinga Experiment Farm. A relatively high mortality rate after arrival among these sheep were attributed to enterotoxaemia and internal parasites. Some of these ewes started lambing in March and by the end of May over 40 lambs had been born. Following this lamb crop and because only one lambing was wanted next year it was decided to put all ewes to the ram in November instead of May as earlier planned.

Thirty-seven wether lambs were sold to the Cold Storage Commision in March; 73 per cent. graded Lamb II and better at an average c.d.w. of 41 lb., value £4 15s. 7d.

After culling off-type ewes, the flock was split in September and then clipped using an improved technique in clipping and grading the wool; this resulted in an average clip per ewe and gimmer of just over 5 lb., an increase of approximately 25 per cent. over the previous year. It is planned to graze half the flock on pastures and half on natural veld in order to assess the wool productivity of the veld, beginning in early October.

Pastures

Dry-land Pastures

Selected kikuyu/clover pastures mown by rotary mower in September began to show regrowth during early October before any rain had fallen, and very rapid growth occurred as soon as rain fell at the end of the month. This was in marked contrast to those pastures which did not receive this "shaving" treatment. As noted earlier in this report the rains'

faltering start and their later wavering into insignificance resulted in a shorter and less productive grazing season than can normally be expected. Plantings of dahl, *Cajanus indicus* and napier, *Pennisitum purpureum*, in the winter foggage block were made according to the rotation. The stand of dahl was excellent and provided valuable winter protein feed. Great difficulty was experienced in the direct sowing of grasses in ploughed or renovated pastures and in some cases the dominance of water grass, *Cyperus esculentus*, caused failure. The production from *Sabi Panicum* during the winter period has been low probably due to this grass being very sensitive to cold. It is considered that dahl and napier fodder can replace *Sabi Panicum* with advantage. The *Desmodium discolor* planted with the rains failed to germinate effectively and after ploughing out was replaced with dahl; the *D. intortum* planted out as seedlings was badly hit by frost and provided very little winter feed.

Irrigated Pastures

Water shortage in the permanent streams on the station made the period from April onwards difficult in the irrigation area.

In December, a 1-acre stand of Gulf Rye grass, produced over 700 lb. of seed. A similar area of Kenya White Clover (*T. semipilosum*), produced over 100 lb. of seed before the end of the year. The annual root break which by rotation changes block each year was planted to Mammoth Purple Top swedes in May. The prime purpose of the roots is to allow hand weeding and the attempted eradication of encroaching kikuyu and is followed on lifting by a quick crop of sunnhemp for silage. Due to a particularly heavy, infestation of kikuyu remaining in the drill lines after inter-row weeding, it was necessary to transplant into the cleaned inter-rows seedlings from the drills. The take of these transplants was completely successful and they have grown well, in marked contrast to five varieties of *brassica* received from Angola for comparison. The six acres in the remaining three blocks were also planted in May using home-produced Gulf Rye grass seed. The cold weather just after planting curtailed good growth and later when the hot weather arrived this grass suffered from extreme water stress; but despite these hardships it has produced, in common with the root crop, valuable feed when most needed.

Trials

Lime Requirement Trial

This was laid down in 1962, to measure the effect of lime on arable crops and grass/clover pastures and to determine the amount of lime necessary. Molybdenum was applied to half the plots when the kikuyu/clover sward was planted after the initial breaking in crop of potatoes had been lifted.

Sampling in early November revealed that the average pH had risen over the last 15 months and in January when the trial was visually scored for clover growth it appeared that low lime with Molybdenum gave a better clover cover than high lime with M. High lime alone was best of all, with low lime without M giving the poorest cover. The kikuyu/clover was sampled in March, a measured area being yielded for total green weight, and, by separating the components of hand-grab samples the percentage of clover and kikuyu in the sward was determined. Results showed that total green weight per acre was highest in the "high lime" plot and lowest where no lime had been applied (± 12 tons and ± 2 tons respectively), both treatments being without M. The highest clover concentration was found in the "low lime" plots with M, with "medium lime" without M a close second; the clover showed up worst in the "high lime" treatments with M. The kikuyu seemed to favour high lime application and yielded least in low lime treatments, the presence or absence of M making little difference. Because of the extremely hot and dry winter the persistence of clover was gauged visually at the end of September, when it was found that Molybdenum appeared to affect beneficially the survival of clover at all lime levels, with the degree of persistence increasing in each up to "medium lime". High lime without M appeared the best; M at "high lime" gave the impression of depressing the clover's survival when compared with all other lime levels. In two replicates where a magnesium deficiency is suspected the total clover cover is almost twice that of the other two blocks.

over Establishment Trial

This trial in two localities, on Umkondo and on Dolerite derived soils, was laid down late 1962 in order to study the behaviour of *T. repens, T. semipilosum* and *T. reupelnum* at three levels each of lime and phosphate. From visual scoring it appears that both the East African clovers are more tolerant of acid conditions on both soils, and benefited ore from phosphate dressings than they did from liming. Growth of all three clovers was tter on Umkondo than Dolerite soil, on both of which 1 ton lime per acre appears to be optimum dressing. On entering its second year the *T. semipilosum* is growing well at all tilizer levels while the *T. repens* is patchy, especially where phosphate and lime are sent.

tional Soya Bean Rhizobium Trial

Detailed results are not yet available, but preliminary reports indicate that the inoculation seed with rhizobia did not increase the resultant seed or fodder crop to any extent, despite fact that inoculated seed had nodulated heavily. The yield level was generally low being the region of 1 ton to the acre of fodder and 800 lb. seed to the acre.

Observation Trials

kuyu Renovation Trial

Burning, ploughing and rotavation of established kikuyu pasture were used in an attempt determine the best method of renovation in conjunction with various fertilizer and lime vels. Kenya White Clover was broadcast on all plots. Because of the unfavourable rains thing really has come of this and it is not to be continued.

eld Improvement Trial, 1961

Because of the dry season, the clovers in all fertilizer treatments are now struggling d are being scorched by the sun due to the sparse veld grass cover. The kikuyu is managing hold its own.

eld Improvement Trial, 1963

Various methods of incorporating kikuyu runners, clover and Katambora Rhodes grass ere twice attempted in a small area of newly burnt bush. Lack of suitable germinating rains ecluded any growth, and although this trial has been abandoned the methods used will tried next year on another site.

ew Zealand Flax (*Phormium tenax*)

These plants are growing well and after $3\frac{1}{2}$ years in a vlei site measure nearly 6 ft.

apier Regrowth Trial

Four blocks of napier were mown and three of these were treated in addition by burning ıly, cultivating only and burning and cultivating, respectively. Little difference in regrowth as observed; burning did not inhibit any regrowth which the dry season allowed, permitting the same time a considerably easier and more efficient inter-row cultivation.

HENDERSON RESEARCH STATION

In this year, the driest since the 1950–51 season, the rainfall totalled 24.45 in., some 2 in. below the average. Of this, 19.11 in. fell in the months December, January and ebruary, and conditions were very dry during the autumn.

Nevertheless, good crops were reaped and pasture conditions were better than usual. ubstantial progress has been made in the research on animal nutrition, especially with the evelopment of high-energy beef-fattening techniques. For his work in this field the Senior nimal Husbandry Officer was awarded a doctorate by the London University. The fisheries xperimental programme has developed steadily, one interesting feature being the intensive eeding of trout in small pools through the cool winter months.

The 300-acre intensive farm unit's gross productivity has been substantially increased almost 80,000 gallons and crops were good. The gross revenue for the 300 acres was pproximately £12,000. The Unit Manager's net profit for the year is expected to be higher ıan in any previous year.

The small-scale units have been greatly improved and in spite of the adverse seas achieved an encouraging level of production and a measure of profitability.

The Department of Conservation and Extension staged a two-day demonstration maize harvesting methods in June which was well attended by farmers and generous supported by the farm machinery trade.

Fisheries Research Centre

During the year there was an increased number of visits by African farmers from ma areas. Groups of farmers, clubs and many individuals visited the centre. Workers fro Rhodesia and neighbouring countries paid visits of varying duration to discuss comm problems and research.

There is increasing awareness of the food potential that exists in conservation dar in African areas, and a number of surveys carried out duing the year have assisted in fo mulating plans for the development of this important source of fresh meat. Particul mention has been made of the interest shown by the people in the Fingo and Ntabazindu areas where the agricultural officer has been able to obtain accurate records of gill netti and long lining in a number of waters. While all waters are fished by rod and line, certa of the larger dams require the use of nets and other gear for efficient exploitation. T problems are essentially localized ones of determining the most satisfactory method organizing the commercial fishing as opposed to subsistence fishing.

Privately owned ponds and small demonstration units are being stocked in a numb of tribal areas and divisions of the Native Purchase Area and afford suitable centres f extension work and sources of fish for stocking. The potential of fish production frequent tends to be overlooked because of its local impact, but in the development of irrigati schemes and water development generally it is most important that this be taken in account.

Demonstrations in farm dams are a potent measure for convicing farmers of the im portance of waters as supplies of food. While many farmers are using gill and seine ne to reap the fish crop, the majority tend to leave this to the rod and line fishing of the labour force. A number of owners allow traps and nets to be used but themselves make n direct attempt at fishing. Marketing problems are posed by sporadic production but in t majority of cases the fish is used on the farms.

All carp rearing and production has been transferred to the new ponds where a restricte number of production experiments will be carried out in future. The original ½-acre an 1-acre ponds have been put down to rotational cropping for *Tilapia* production and invest gation on basic productivity and chemical aspects of fertilizing. In the first part of the yea these ponds served as carp production units, fry ponds and the production of *Tilapia* i association with predatory fish. Fifty-two small ponds were used to explore problems c management in small so-called "family" ponds. Large ponds were used as bulking, storage an breeder/holding ponds. Early in the 1964 season a block of nine ponds, filled by seepage was brought into operation as a demonstration and research unit in order to investigat the economics and production problems of a unit under rotational cropping, being run i association with a small area of vegetable and fruit growing and poultry rearing. All bas breeding ponds were left empty and put down to a green crop over the winter perio This does not appear to have markedly increased their fertility.

Measurements of water from the river, furrows, seepage canals and the water balanc of the Savory Dam clearly demonstrate the fact that ponds in association with irrigatio projects use water to full advantage and that the actual water lost to a river by abstractio is relatively little.

Extremely low water temperatures resulted in the deaths of large numbers of fish, par ticularly in smaller ponds and among smaller fish stocked before winter. Minimum wate temperatures in June as low as 42°F. were recorded. Maximum furrow temperatures occu in December at an average of 82°F.

ory Dam

The angling pressure was purposely decreased during the year. This resulted in a eased catch as compared with last year. Regular seine and gill netting were carried out connexion with the programme of studies on the biology of fish in irrigation dams. It pparent that growth of fish has been unsatisfactory despite relatively heavy fishing and presence of predatory bass. Shallow dams lend themselves to the use of fertilizers which ease natural food production. This, coupled with heavy fishing and the beneficial effects exposure of the bottom in fluctuating irrigation dams, provides means of increasing the p.

s Breeding

Some 20,000 bass were successfully reared for stocking of angling and other waters. consignment of 7,000 was sent to the Kyle Dam where the original planting in 1961 is ady resulting in large-sized bass.

out Trials

Larger-scale trials of growing trout to acceptable table size, using mainly prepared pellet ds, were carried out from May to the end of September. Lack of oxygen following a uced water flow is a contingency to be guarded against. The use of copper sulphate in nbating algal growth in the tanks and a filter is being investigated and tests of copper phate toxicity on trout were carried out. Growth, health and food conversion on the let diet is satisfactory and the rearing of trout in Mashonaland is now a practical possi- ty provided a sufficient amount of clean water is available.

rp Production

Although the 1963 spawning was successful serious difficulties were experienced with the ring of young fish. In consequence, very few fingerlings were eventually available for ther stocking. Heavy predation can account for only part of the mortality. Production periments indicate that the rapid growth ability of the fish, when stocked in numbers more than 400 per acre, leads to rapid overgrazing of the natural food supply. Growth newly constructed ponds was poor despite relatively heavy fertilization.

Production of 1,500–2,000 lb. per acre is obtainable, but high production generally pears to be associated with poorer quality fish.

Further production trials will aim at the production of fish 2 to 3 lb. in size.

lapia Production

As part of the programme to investigate the raising of larger sized *Tilapia*, predatory n were introduced to reduce unwanted fry. Experiments were carried out with bass/*Tilapia* d *Serranochromis*/*Tilapia* combinations. *Serranochromis robustus* breed freely in ponds d the young fry are markedly predatory. Where large numbers of fry are present there pears to be an almost total elimination of *Tilapia* in the 1–8 oz. group. Fish over 8 oz. nstituted over 90 per cent. of the production. Levels of production were of the same der as those obtained in the control treatments. The adult *Serranochromis* by comparison en in high proportions seem to have only a small effect. *Tilapia mossambica* are propor- nally more intensely preyed on than *T. melanopleura*. Bass stocked as 4–6 in. fish appear be more predatory than the adult *Serranochromis*. The proportion of fish over 8 oz. was this case also over 90 per cent. and *Tilapia* in the size group 1–8 oz. were eliminated. rther experiments are being carried out with reduced numbers of bass after *Tilapia* awning has taken place. Concurrently trials are in progress to explore the possibility of lf-reduction by the *Serranochromis*.

eeding, Biology of Tilapia and Other Species

Closer studies are being caried out on the beeding of the *Tilapia* species which may of importance in pond culture in Rhodesia. These entail observations of numbers of eggs d the number of broods, the periods of spawning, etc., and cover a variety of conditions om ponds to large conservation dams.

Hybrids

Further work on *Tilapia macrochir—T. mossambica* hybrids is continuing. *Tila* *placida* are being reared in order to study the possibility of producing all male bro by crossing this species with *T. mossambica.*

Effects of Fertilizer and Water Chemistry in Fish Ponds

A series of observations on the concentration of phosphates, nitrates and other nutrie has been started. This is being studied in detail on ponds at the Fisheries Research Cer but it is hoped that these data will be supplemented by observations from other sour The levels of nitrate, while high in the feeding furrows, appear to drop considerably ponds as a result of its uptake by plants. Phosphate rapidly disappears from the wa after fertilizing but may be slowly released from the soil. These observations call for m critical studies on the cycle of nutrients and will afford a basis for practical econon methods of increasing natural fertility.

Animal Husbandry

Studies of nitrogen metabolism and protein requirements for maintenance of indigen breeds of cattle and sheep were intensified during the year and much useful informati has been obtained. No marked breed or species differences in protein requirements w observed but requirements have been shown to be markedly affected by the type of d (roughage content) and the level of energy-yielding nutrients that are fed. In general, wh the energy content of diets has been adequate, maintenance protein requirements, det mined from liveweight data or in balance trials, have been shown to vary from one-third one-half of what has hitherto been considered necessary. This work has been reported overseas journals and has attracted a measure of international interest.

The Senior Animal Husbandry Officer attended the sixth International Congress Nutrition in Edinburgh and the World Conference on Animal Production in Rome. the former, a paper presenting the results of recent research was presented.

Towards the end of 1963 and during the winter of 1964 studies were initiated explore the possibility of using high-concentrate diets for fattening beef cattle. Prelimina results have indicated minimal levels of roughage required by ruminents, and progress h been made in assessing protein requirements of cattle fed on these concentrated diets. Fr this work it has been possible to develop a new system of feeding beef cattle and, in m instances where the method has been tested in practice by farmers, results have been ve encouraging. It is hoped that this branch of research will be greatly expanded next ye

The help of, and collaboration with, members of staff of the Department of Agric ture, University College of Rhodesia and Nyasaland, has been most valuable. This associ tion has provided much-needed support in the field of nutritional biochemistry.

Agronomy

Despite the unfavourable rainy season good yields of dryland maize (up to 41 ba per acre), cotton (up to 3,069 lb. seed cotton per acre with high nitrogen and two supp mentary irrigations), soya beans (11.8 bags per acre from variety Hood) and groundn (1,708 lb. shelled kernels per acre from one of the better plots) were recorded.

In a small-scale maize competition a yield of 66.8 bags per acre was recorded fro maize following a lucerne ley. The maize received 100 lb. nitrogen at planting, 80 l nitrogen at hip height, 50 lb. P_2O_5, and 60 lb. K_2O per acre. It was planted on 16th Septe ber, 1963, at 21,250 plants per acre with single hybrid No. 52 and received five irrigatio of approximately 3 in. before December. This maize received approximately 260 lb. nitrogen, since the lucerne which preceded it supplied approximately 80 lb. nitrogen. Th is 110 lb. more nitrogen than it took to produce the 41 bags on dryland. At a cost £3 per acre foot of water the 66.8 bags per acre cost £3 15s. 0d. to irrigate. In overa cost the supplementary irrigated maize cost approximately £12 per acre (fertilizer £6 water and seed, etc., £6), more than the dryland crop but yielded 25 bags per acre mo than the dryland crop.

Dryland and late planted (4.12.63) cotton with standard fertilizer, weeding, spacing, , yielded 1,394 lb. seed cotton. Supplementary irrigated cotton planted 1.11.63 with stan-d spacing, weeding, etc., and which received a heavy fertilizer application (100 lb. ogen and 80 lb. P_2O_5) yielded 3,069 lb. seed cotton. Supplementary irrigated cotton ded regularly yielded 2,528 lb. and that not kept clean in the first 40 days 1,811 lb. seed on per acre (both of the latter were planted on 1.11.63 and received a standard fertilizer ssing).

The soya bean variety Hood yielded 11.8 bags per acre; the next best were Hill, 53540,)12, Hernon 135, Hernon 107 and 59S143 which all yielded between 9.1 and 9.9 bags acre. Palmetto 612/61, C8012 and Hood shattered badly but most of their grains were ked up by hand.

The irrigated crop programme progressed satisfactorily. On account of the fact that professional post was vacant throughout the year, the vegetable programme has been ricted.

Potato yields of over 30,000 lb. of tubers were recorded, and over 11 tons of oven-dried erne were produced per acre. Lucerne continued to respond well to phosphate applied rates of up to 120 lb. P_2O_5 per acre.

Over 2,000 lb. of Burley tobacco was produced per acre and sold at an average price over 33d. per lb.

The maize-breeding programme was carried out. In order to speed up the work, the d produced in the backcrossing plots was reaped early, planted at the Sabi Valley periment Station on 28th April, 1964, and will be harvested in time for the coming son.

Alongside the maize-breeding plots, inbred maize seed obtained from Natal in 1962 s tested for the first time. In addition, a variety x population trial and the district riety trial were carried out on behalf of the Agricultural Experiment Station, Salisbury.

Progress was made with fibre crops in the course of the year. Kenaf trials were carried t in selected areas to determine the varieties most suitable for Rhodesian conditions. is work has thrown up a number of varieties which show desirable characteristics and rit further work. Seed bulking of these varieties has commenced. Yields of dry fibre r acre vary between 1 ton in the highveld and 2 tons under irrigation in the lowveld. rieties under investigation suggest that the reaping season, at one time a serious bottle-ck, could be lengthened to a 10–12 week period. More detailed trials on disease resis-nce, spacing and weed control have also been carried out.

Trial areas of sisal were established in selected areas of the country and a survey now ing carried out by a specialist consultant should give indications as to the future prospects this crop. Methods of planting *Phormium tenax* are being improved.

A survey of the potential production of Hyphaene palm as a source of fibre indicated at the yield is disappointingly low. More detailed exploration, however, has been initiated nce overseas information confirms that even a limited yield of this fibre might be profitable.

Pasture Research

Studies of forage flow sequences for beef breeding cows, weaners and fattening cattle ere continued.

It is now clear that a beef herd of 35 livestock equivalents, comprising 1 bull, 12 cows id their progeny amounting to 10 weaners, 8 feeder steers and 11 heifers of which 7 are calf, can be supported in perpetuity on 54 acres of dryland made up of 45 acres of sturage and 9 acres of anual crops as follows:

24 acres of vlei for spring and autumn grazing.
19 acres of fertilized improved pastures used for summer grazing.
2 acres of perennial legume for silage.
4 acres of annual legume for silage.
5 acres of maize used as a corn and cob supplement for the dry season.

The annual fertilizer input necessary to maintain this carrying capacity totalled som tons of calcium ammonium nitrate and 2 tons of single superphosphate. It is clear the saleable product from this 54 acres of dryland can be stabilized at 10 fat stock annum, worth £450.

Work is in progress on fertility maintenance and on the stability of production fr both veld and improved pastures. Concurrently with this critical small-scale experim have shown that inputs of fertilizer have hitherto been very much below those necesary achieve optimum productivity and quality in summer-grazed herbage, as well as in ma Favourable increases in herbage yield have been obtained with up to 280 lb. nitrogen acre, whereas generally only 80 lb. nitrogen per acre is used. It is evident that the 54 ac of improved pasture, annual legume and maize necessary to carry this number of anim could be considerably reduced by larger applications of fertilizers. The fact that 100 c are being supported by 40 acres of fertilized pasture through the four rainy months in 300-acre unit on Henderson gives an indication of the possible importance of highly p ductive summer grazing as a measure for stabilizing winter grazing resources, controll erosion and increasing the numbers and productivity of the national herd. A substan programme is being put into operation using heavy nitrogen dressings on costed livest farming units and in supporting critical investigations. This is a logical and urgently nee next step in the development of practical pasture technology.

Beef Breeding Cows

Vlei grazing, stocked at a rate of seven cows per eight acres provided grazing for days from 27th August to 10th December. As in the previous year the cows were 5 lb. corn and cob meal and 3 oz. urea daily, and in addition were given approximat 10 lb. maize stover each per day. In comparison with the previous year, where a loss 40 lb. per head was recorded before calving commenced, a gain of 35 lb. per head v achieved. Stover therefore appears to be a very suitable source of roughage for in-calf b cows. Summer grazing was provided by Giant Rhodes grass from 10th December to 2 April at a stocking rate of three cows and two calves per two acres. During this period 136 days the cows gained 140 lb., and the average weight of the calves, which on acco of the dry season were weaned a month earlier than usual, was 348 lb. at weaning. This lighter than normal but since weaning they have continued through winter to make sa factory growth on a ration of 10 lb. legume silage and 2½ lb. corn and cob meal with veld grazing.

Pregnancy tests on the cows show that 85 per cent. of the animals are in calf, compared with 83 per cent. in the previous year.

Fattening Stock

Ten Aberdeen Angus weaners, weaned at the end of May, 1963, and overwintered maintenance level on a diet of 10 lb. legume silage and 2½ lb. corn and cob meal on ve grazing, were run through the following summer on 6 acres of sown pastures from 1 December to 5th May. By the end of this period the average weight of these animals w 623 lb., giving an increase of 192 lb. per head in a 146-day period, at a stocking rate five animals per three acres.

At the end of the summer period these animals were penned and fed 30 lb. legu silage and 10 lb. corn and cob meal with stover *ad lib.* The ration was later increased 35 lb. and then 40 lb. of silage with 12½ lb. corn and cob meal as the animals increas in weight. By 30th September the average weight was 822 lb., a gain of 1.36 lb. per da It is anticipated that these animals will be ready for slaughter in mid-November.

The sown pastures grazed in summer by these animals consisted of two acres each Giant Rhodes grass, *Panicum repens* and *Beckeropsis uniseta.* For compartive purpos the Giant Rhodes grass, a fourth-year pasture gave 38 days' grazing; *Panicum repens,* first-year pasture provided 42 days' grazing, and *Beckeropsis uniseta,* a third-year pastu

ve 46 days' grazing per acre plus a further 21 days in spring while stock were still receiv-g supplementary feed. These pastures were all stocked at a rate of five weaners per three res.

JMMER MILK PRODUCTION

Studies of the summer production of milk continued until the end of May, 1964, when e Friesland herd was transferred to the small-scale intensive farming project. The average ilk production over a 222-day lactation from 21 cows, starting in October and finishing the end of May, was 4,445 lb. per cow or two gallons per day. All animals received supplement of 5 lb. corn and cob meal during their lactation and were grazed on 48 res of vlei and 30 acres of planted grass pastures during this period. They were also lowed legume grazing from 12 acres of *Desmodium* on a supplementary basis. During e summer grazing season the cows were on vleis for 85 days and sown pastures for 137 ays, the vlei grazing being used at the beginning and the end of the grazing season.

All animals gained satisfactorily through the summer and at the end of March when e bull was removed, 90 per cent. of the cows were in calf.

Maize yields in general were slightly down on previous years. Using a standard fertilizer pplication of 80 lb. nitrogen and 38 lb. P_2O_5 per acre, yields varied from 17.5 to 27.2 bags er acre.

EGUMES

Silage yields of 7.28 to 8.62 tons of edible silage were obtained from the annual Jack ean (*Canavalia ensiformis*). These are comparable with previous yields.

Work continued with two perennial pasture legumes *Desmodium discolor* and *Desmodium ntortum*. Establishment under cover crops of maize was unsuccessful as a result of poor ainfall after planting.

Six acres of *Desmodium discolor* provided 22 dairy animals with 20 days' supplementary razing at two hours per day during January and February. In March a further seven days' ull grazing was obtained from this area.

A six-acre stand which has been allowed to grow out for seed produced only 40 lb. lean seed per acre which was considerably less than normal. After seed collection the esidue was grazed and provided four days' grazing per acre in June for 14 animals. Attempts o establish *Desmodium discolor* in veld were largely unsuccessful but further attempts will e made during the coming season. Results of experiments continue to show that *Desmodium liscolor* is unable to maintain its vigour when more than one silage cut is taken in a season. Continuous grazing throughout the growing season also appears to affect vigour if it is not allowed to grow out well first.

Six acres of *Desmodium intortum* were also used as supplementary grazing for the dairy animals and provided 44 days of two hours each per acre during January and Feb-ruary and an additional seven full days grazing in March. At the end of February a sample cut was taken in a field of *Desmodium intortum* with a flail-type forage harvester and this showed that there was still some 4.5 tons of edible material left. No ill effects have been detected from heavy utilization of *Desmodium intortum* pastures and it is able to remain vigorous and free of weeds even under relatively dry conditions. No seed was reaped on account of severe early frosts and in general new plantings were disappointing.

A silage cut taken from a three-year-old stand of *Desmodium intortum* yielded 10 tons of silage per acre.

GENERAL EXPERIMENTS

In an experiment where for the past five years triple superphosphate has been used to supply the phosphate requirements of grass, legumes and maize, no response to sulphur in the form of gypsum has been obtained.

Investigations into the effects of various stocking rates and burning frequencies on veld used for winter grazing continue. No differences have been detected in daily weight gains per head between grazing pressures of 24, 36 and 48 days per acre over the fixed period. Burning treatments, although they were only imposed three years ago, are beginning

to show differences in veld species. The annual burn appears to be controlling copp regrowth satisfactorily, whereas in the case of the three-yearly burn some of the coppice becoming too big to be effectively controlled by fire.

Results from an experiment comparing Giant Rhodes grass and *Hyparrhenia* veld unc various cutting frequencies and fertilizer levels show that while the dry matter producti of both swards was increased by the addition of nitrogen, there was no difference in grc herbage yields between the two grasses. In previous years the veld plots have outyield the Giant Rhodes grass plots and the change in result this season may be due to the fa that the percentage of Giant Rhodes grass in the plots is decreasing. The grass remai vigorous even in those plots which have been cut at fortnightly intervals for the past thr growing seasons. The highest yields of dry matter were obtained from those plots whi were cut only once per season. Nitrogen recovery figures show that slightly more nitroge was recovered from the Giant Rhodes grass than from the veld plots, and that the plc cut every fortnight yielded about three times as much nitrogen as those cut only once p season. This experiment is to be continued for one more season.

In an experiment, conducted in the 1962–63 season and at present being analysed ar written up for publication, high applications of up to 400 lb. nitrogen per acre were appli to a four-year-old Giant Rhodes grass pasture and gave a linear increase in dry matt yield from 3.16 tons with no nitrogen to 6.01 tons per acre with 400 lb. nitrogen. Th addition of more nitrogen, up to 800 lb. per acre, gave a negligible additional response i yield. Up to a limit of 200 lb. of nitrogen applied per acre, an increase of 20 lb. of dr mater resulted from every pound of nitrogen applied. From 200 lb. to 400 lb. of nitroge the increase was 5 lb. dry matter per lb. of nitrogen applied and from 400 to 800 lb of nitrogen the increase was only 0.3 lb. dry matter per lb. of nitrogen. The amoun of protein, and presumably the quality of the herbage, was also increased by higher amoun of nitrogen. These results give a lead to future work and it is clear that the decline in pro ductivity of pastures can be counteracted by applications of nitrogen, although the highe the costs incurred, the more efficient the animal factor must be to pay for the expens This line of research will be pursued with vigour in future.

Small-scale Intensive Farming Unit

The object of the unit research work is to explore and develop the economic potentia of simple small-scale farming systems which will maintain the health of the soil. As a star three systems are in operation; a mixed crop and animal farm on 80 acres, a small crop farm on six acres and a pasture and forage crop farm with 20 cows on 60 acres. Detailed cost accounts have been kept for all the units and this work is giving valuable knowledge of the circumstances currently encountered by the small farmers in the tribal areas. Methods appropriate to these difficult conditions are evolving in a very encouraging manner. Notes on progress made on each farm are given below.

The 80-acre Mixed Farm

This farm consists of 20 acres of vlei, 20 acres of arable land of which 8.5 acres are under crops, and 40 acres of rough granite sandveld grazing. It is comparable with the area which a Tribal Trust farmer has available to him in the high rainfall parts of the country.

The project has now been in existence for three seasons and has reached a stage where most of the initial development work has been completed and full production within the limits of the system can be expected.

Results to date are encouraging in that the gross product from the labour equivalent of a family unit has increased from £147 in 1961–62 to £351 in 1962–63. However, it dropped to £281 this last season partly as a result of the severe drought, but principally because the cows were only milked once instead of twice a day, and the calves were allowed to run with their mothers during the day and penned at night.

The drought affected crop yields adversely and also resulted in a shortage of grazing and feed. The crop yields for the season from the 8.5 acres were 35 bags of maize grain,

tons of maize silage, 1,107 lb. of unshelled groundnuts, 1,241 lb. of rapoko and 343 lb. cotton.

The livestock complement consisted of three indigenous cows, 14 ewes, two rams and o donkeys. Nine lambs were slaughtered and sold and on 30th September, 1964, 12 lambs re still on hand. The need to improve grazing and feed supplies is evident and an propriate programme has been planned for the coming season. The three cows milked once lay produced 312 gallons of milk.

The poultry produced 2,676 eggs and 74 lb. of dressed birds. It is intended that a flock 25 laying hens will be kept in future. Towards the end of the year six ducks were intro-ced.

Production from the garden continues to increase, 1,524 lb. of vegetables having been oduced during the year. A rotation which will ensure continuous supply of greens and fruit s been evolved.

The family fish pond which has been dry throughout the winter is ready for stocking soon as the rains fill it.

rop Farm

Of the 12 acres stumped, cleared and prepared for cultivation, six acres were planted crops, 1½ acres to *Desmodium discolor* and 4½ acres established to a Giant Rhodes grass y.

In this, its initial year, the crop yields for the 1963–64 season were 20 bags of maize ain, 2,209 lb. of Burley tobacco, 619 lb. of cotton and 144 bags of unshelled groundnuts.

The committee had decided that in future continuous rotational cropping of the above ops will be practised on six acres, without the addition of manure or the use of leys. The ason for this is that there are a number of African farmers who have no livestock owing tsetse and other reasons and who have to rely solely upon fertilizers and crop residues maintain the productivity of the soil. Optimum amounts of inorganic fertilizers will be pplied and all crop residues will be returned. A collateral experiment has been planned which various practical ways of maintaining fertility under continuous cropping are to be ied. Fertilizers, composts and crop residues in various forms and combinations will be used.

Buildings erected during the year consisted of a Burley barn big enough to handle the op from 1½ acres, and a pole-and-dagga thatched dwelling. A well, 30 ft. deep, was sunk ear the house.

This farm, it is hoped, will provide information on "stockless" crop farming in African reas.

nimal Farm

This consists of 60 acres on which 20 Friesland cows and followers will be kept, initially n a summer milk production system. The intention is to investigate the feasibility of inten-ive livestock farming on small acreages.

Some 12 acres of vlei have been planted to *Panicum repens* and a further two acres f topland were planted to Giant Rhodes grass and *Desmodium intortum*. *D. intortum* has isappeared and it is apparent that the findings on heavier soil types cannot be applied to andveld. There is a need for investigations into suitable grasses and legumes for use in ntensive farming systems such as this on sandveld.

Four Friesland cows and four heifers were kept on the farm in this the first season o utilize the feed available, and they produced 16,574 lb. of milk. The herd has since been nade up to 16 cows, four heifers and a bull. A herring-bone type of dairy has been built nd full-scale production will commence in October.

Maize was grown this season on 11 acres in order to provide silage and grain for the ncoming herd.

Crop yields for the 1963–64 season were 67.4 bags of maize grain and 75 tons of maize ilage.

While the gross revenue attained by the mixed farm has been in the region of £350, nd by the crop farm some £215, there is every reason to expect that these figures will be

doubled in the forseeable future, as experience and skill accrue. Each farm is operated by labour force of three men, which is considered to be equivalent approximately to the labo of an average African family. In the case of the 60-acre animal farm, previous work summer milk production suggests that the 15 cows may well yield a gross product of 4,5 gallons in the coming summer.

MAKOHOLI EXPERIMENT STATION

Rainfall was approximately 9 in. below the recorded mean, and the effect of this w marked in all aspects of the station's work. The late start of the rains coupled with a d period from mid-December to the end of January were most detrimental to crop growt

An unprecedented number of frost days —35 in all —occurred over June, July and Augu the maximum frost being 13.4°.

Apart from field days arranged for participants in Alvord training programmes, farm groups from Serima, Zaka, Selukwe, Chilimanzi and Victoria visited the station, and a fie day was given to delegates attending the African Intensive Conservation Areas' conferen held in Fort Victoria. Numerous individuals and small parties, both Rhodesian and fro elsewhere, also visited the station, contributing to a total of 611 visitors for the year.

Agronomy

DATE OF PLANTING OF TURKISH TOBACCO (in co-operation with the Tobacco Research Boar

The final yield and grade data for this experiment are now available from the Tobacc Research Board. The variety was Samsun, and the six planting dates were arranged in fi replicates:

Planting	*1960–61*		*1961–62*		*1962–63*		*3-year Mean*	
Date	*Yield*	*GI*	*Yield*	*GI*	*Yield*	*GI*	*Yield*	*GI*
Nov. 15					1,068	25.5	1,068*	25.5
Dec. 1	1,148	38.4	636	22.2	1,325	27.7	1,036	29.4
Dec. 15	1,245	43.4	743	24.2	1,231	29.2	1,073	32.3
Jan. 1	1,073	42.0	441	24.0	1,168	28.7	894	31.6
Jan. 15	713	36.1	436	23.7	799	28.5	649	29.4
Feb. 1	618	39.8	405	22.1	606	28.0	543	29.6
Feb. 15	783	44.1	322	22.0			552†	33.0
Mean	930	40.6	497	23.0	1,033	28.0	820	30.5

Yield in lb./acre
GI = Grade Index

* One year's data
† Two year's data

The yield differences between years canot be attributed solely to seasonal fluctuations in 1960–61 the crop was grown on virgin land without fumigation; the 1961–62 trial wa sited on old rotational cropping land without fumigation; and the 1962–63 crop was als grown on old rotational land, this time fumigated before planting.

The results illustrate with a high measure of consistency the optimum planting dat for Turkish tobacco to be mid-December, with a spread of work earlier, rather than late than this optimum suggested.

THREE-YEAR ROTATIONS WITH TURKISH TOBACCO (in co-operation with Tobacco Researc Board)

This work is designed to investigate the possibility of growing Turkish tobacco i short-term rotations, including maize, rupoko, munga, groundnuts and *Sabi panicum*. Th experiment completed Phase I in 1963–64, and continues.

This trial is carried out on old rotational cropping land and all tobacco plots ar fumigated pre-planting.

The first results available (1962–63) suggest the advantage of growing the crop afte grass to be slight.

ENGTH OF ROTATION TRIAL WITH TURKISH TOBACCO (in co-operation with the Tobacco Research Board)

Turkish tobacco rotates in 2-, 3- and 4-year Love grass leys, early and late ploughed, ith and without fumigation. This experiment completed its first year in 1963–64 and no sults are yet available.

ERTILITY MAINTENANCE TRIAL (in co-operation with the Agricultural Research Council and Chemistry Branch)

Soil stability and crop response at three levels of mixed N.P.K. and four levels of ompost input are measured under continuous rotational cropping with maize, groundnuts nd sorghum. This trial completed its fourth year in 1963–64.

The treatments, which are applied in full factorial combinations, are:

Maize: 0, 3, 6, 12 tons compost/acre,
0 fertilizer,
125 lb. "M" + 75 lb. urea/acre,
250 lb. "M" + 150 lb. urea/acre.

Groundnuts: nil.

Sorghum: 0, 125 lb. "M", 250 lb. "M"/acre.

Lime is added prior to the groundnut phase to adjust pH.

The season was such that responses to the fertilizer treatments were virtually negligible n all three test crops. The direct application of compost to maize increased yields in a linear manner up to the 6-ton/acre level, the maize responding from 6 bags/acre at 0 compost o 12 bags/acre at 6 tons of compost. The indirect response of the groundnuts to compost was near linear from 2.8 bags kernels/acre at 0 compost to 4.5 bags of kernels/acre at 12 ons/acre. The sorghum phase which has to date been the most unsatisfactory feature of he experiment was extremely poor. It is of interest to note that the lowest yielding plots n all crops were the 0 compost--high fertilizer treatment, substantiating a trend first noted in the previous season.

The low pH and phosphate status, and depletion of bases in the absence of compost is marked. It is clear that one of the objectives of this work, *viz.* whether inorganic nutrients at the levels provided would meet fertility requirements, has been answered. The trial will continue with higher P_2O_5 and K_2O inputs and increased lime applications to assess whether the present fertility status can be raised. The direct and residual effects of compost applications are to be appraised in a separate critical study.

SULPHUR TRIAL No. 1 (in co-operation with the Agricultural Research Council)

Crop response to this nutrient (0, 10, 20, 40 lb. S/acre) on recently developed (unfertilized) lands is being examined, with the object of obtaining preliminary information on the sulphur status of sandveld. Measurement of residual effects are catered for in the trial of maize-legume-maize sequence. This experiment completed its first year in 1963–64 and the response to the sulphur treatments was negligible.

ROOT RESTRICTION OBSERVATIONS (in co-operation with the Agricultural Research Council)

Stoppage of main Turkish tobacco tap roots at about 4½ inches has been examined. Soil bulk density and percentage air space in the 3 in.-6 in. and 7 in.-10 in. layers show little variation, but pH values ($CaCl_2$) drop from about 4.8 in the top 4 in. of soil to approximately 4.3 in the 4 in.-8 in. layer. The project continues.

GROUNDNUT FERTILIZER AND LIME OBSERVATIONS (1963–64 only)

Field-scale observations were made on the response of Natal Common groundnuts to lime, phosphorus, borate and gypsum, with the following results.

The mean response to borate and gypsum did not enhance yield, it was observed that the presence of each was generally favourable to the expression of the other respective individual treatments. The lower response to phosphorus in the presence of lime and its

converse was probably a result of the lime increasing the availability of soil phosphate. The overall yield of 3.7 bags of kernels/acre is indicative of the season; moisture conditions at flowering time in particular were adverse.

Maize Varietal Observations

In a non-critical trial the yield of the single hybrid SH52 (at 16 b.p.s.) was particularly interesting in view of the nature of the season, and the superiority of this hybrid compared with the standard double white hybrids (at $5\frac{1}{2}$ to $8\frac{1}{4}$ b.p.s.) was further substantiated in the much wider scale general cropping programme.

Animal Husbandry

Veld Supplementation Trial

Six 10-cow groups are involved in a lifetime productivity study of the response to various supplements to veld grazing. This work entered its fifth season in 1963–64 and the accumulated weaner weights per treatment are as follows:

Treatment	Bone Meal				Total	
	Absent		Present			
	lb. weaned at 200 days 1961–64	% increase over control	lb. weaned at 200 days 1961–64	% increase over control	lb. weaned at 200 days 1961–64	% increase over control
Control . .	6,595	—	8,028	+21·7	14,623	—
Vitamin A .	6,361	−3·5	7,958	+20·7	14,319	−2·1
Protein . .	8,400	+27·4	10,385	+57·5	18,785	+28·5
Total .	21,356	—	26,371	+23·5	47,727	—

The animals are run together in an area of approximately 600 acres, being separated into their treatments in group feeding pens for a short period each morning. Salt is common. Supplements other than bone meal are supplied during the dry months of May-November, and bone meal is available the year around. Groundnut cake forms the protein supplement in view of its low phosphate status.

Particular interest centres around the response to bone meal which previously has shown benefit in both calving rate and weaning weights. In the year under review, differences in calving rate were slight between treatment groups, largely on account of the control group having "caught up" to the performance level of the bone meal and protein supplemented groups. This was presumably brought about by the attainment of maturity in the control group. The bone meal and protein supplements continued to maintain an advantage over the control group in calf weaning weight, but this effect was somewhat less in the case of bone meal this year, being about 23 lb., as against 34 lb. in 1962–63.

Further results will be needed before firm conclusions can be drawn regarding the cumulative nature of the treatment effects.

Ovarian Activity Studies

Ancillary to the veld supplementation trial, ovarian activity has been checked in each female by rectal palpation at monthly intervals, commencing August, 1960.

Observations at this stage confirm previous trends:

(1) There is marked individuality within all groups.

(2) Four to six weeks after parturition appears to be the minimum period before resumption of sexual activity.

(3) The greater number of calves born in the protein and bone meal supplemented groups over the whole period of the experiment can be attributed to the earlier resumption of normal reproductive cycling in these treatment groups.

ONE MEAL SUPPLEMENTATION TRIALS

This study follows from the interesting results obtained in the veld supplementation trial respect to dam response to bone meal. The present work seeks information on bone meal fluence on post-weaning growth of the 1963 and 1964 weaners from the parent trial. Each spective group of weaners were balanced for their preweaning (dam) treatment and sex, id placed on a simple presence and absence of bone meal from weaning. Animals are azed together on the veld, and the two groups (salt, bone meal plus salt) are separated to their respective supplement group feed pens for a short period each morning. Group ntakes are recorded.

The mean post-weaning gain per animal of the 1963-weaned group is set out in the llowing table:

POST WEANING GAINS MAY, 1963 TO MAY, 1964
(lb.)

	Post Weaning Bone Meal			
	Absent		Present	
Overall gain	120		163	
Sex: Males	120		178	
Females	121		147	
Pre-weaning: Bonemeal	Absent	Present	Absent	Present
	125	117	161	164
Protein 0	125	116	147	164
1	124	119	158	164

The gains recorded were all summer gains—the treatment effect was negligible during the 1963 dry season. The absence of a winter treatment effect has been confirmed with the 1964 weaned group.

It may be observed from the above data that the presence of post-weaning bone meal increased gains some 30 per cent. over the control group, and there was a marked differential response between sexes. Further, the effect of the bone meal appears additive, irrespective of pre-weaning treatment. Individual calves however retained any weaning weight advantage.

A photographic record of detention is being maintained on the 1964 weaned group.

PROGENY TEST EVALUATION OF PERFORMANCE SELECTED SIRES, 1963

This is a preliminary study to examine the growth, efficiency and carcass attributes of progeny from a group of top performing sires.

Five Mashona sires selected as the best performers in terms of efficiency of conversion and daily gain from a group of 100 performance-tested young bulls in 1961 were mated to random cow herds in 1962. Of the resultant progency, the males were in turn performance tested, and the females veld raised.

The comparative growth data of the respective progeny groups follows:

PROGENY GROUP PERFORMANCE RELATIVE TO SIRE GAIN AND EFFICIENCY RANK

Sire			Bull Progeny				Heifer Progeny	
	Daily Gain	Efficiency	Daily Gain		Efficiency		Weight at 18 month	
No.	Rank	Rank	(lb.)	Rank	lb.+	Rank	(lb.)	Rank
62	2	1	2.19	1	4.76	1	496	1
636	3	2	2.18	2	5.24	4	478	2
613	1	3	2.17	3	4.94	2	474	3
41	5	4	2.06	4	5.12	3	470	5
44	4	5	1.88	5	5.56	5	473	4

+ lb. T.D.N. consumed/lb. gain

This project is essentially a uniformity test as the original differences recorded between sires on performance test were slight, ranging from 2.5-2.1 lb./day for gain and 5.0-5.8 lb. T.D.N./lb. gain for efficiency. Thus it was not anticipated that any marked differences would be apparent between the respective progeny groups.

A general consistency in rank order, more especially where progeny performance is related to sire efficiency, may be noted.

PERFORMANCE TEST OF MASHONA, TULI AND MANGUNI WEANER BULLS, 1963

This project was completed in November, 1963. A 65.2 per cent. T.D.N. and 8.3 per cent. D.P. ration was common throughout, and the test period was 120 days. The gain and efficiency data recorded are summarized in the following table:

SUMMARY OF BULL PERFORMANCE TEST DATA, MAKOHOLI, 1963
Means and Range

Breed	Age	No.	Gain Data		Efficiency Data	
			lb./day	Range	lb. T.D.N./ lb. gain	Range
Tuli . . .	Yearling	20	2·7±·6	2·1—3·6	6·7±·9	8·2—4·9
Manguni . .	Weaners	14	1·9±·4	·9—2·4	5·5±1·2	9·0—4·4
Mashona . .	Weaners	84	2·1±·3	1·5—3·0	5·2±·6	7·2—4·0

(Data adjusted for differences in mid-weight.)

It is of interest that in the sample tested, the performance of the Manguni weaners could not be distinguished from that of the Mashonas.

The Makoholi-born Mashona bulls tested in 1963 represented the first progeny of performance-selected sires to enter performance test. The group from which these sires were selected came from two sources, the Makoholi herd and other breeders. The performance test of their unselected male progeny was run concurrently with a further group of bulls from other breeders in 1963. Although this latter group of animals probably represented the better weaners of the breeders concerned, it cannot be assumed that strict attention was paid to the efficiency or gaining ability of their respective sires.

Regarding the non-Makoholi animals as controls, comparison between sires and progeny generation distribution of the trait, feed efficiency, would suggest that response to selection had occurred in the more intensely selected group.

QUARTILE DISTRIBUTION OF BULLS RANKED IN ORDER OF EFFICENCY OF FEED CONVERSION

Quartile	*Parental distribution 1961 (yearlings)*		*Progeny distribution 1963 (weaners)*	
	Control	*Selection Group (before selection)*	*Control*	*Selection Group*
. . . . .	23%	27%	Nil	36%
1	21%	29%	24%	25%
1	28%	22%	32%	22%
1	28%	22%	44%	17%
. . . . .	50	50	29	55
ean	6·7	6·6	5·5	5·0
. T.D.N./lb. gain) .	±·8	±·7	±·9	±·7

The indications are, then, that the principles upon which performance testing is based ay have application to the indigenous stock of this country, in as far as feed lot condi- ns of nutrition are concerned.

ONCEPTION EVALUATION OF DEEP FROZEN SEMEN OF INDIGENOUS BULLS ON INDIGENOUS COWS

Previous work has shown that the conception rate to fresh-cooled semen conveyed by ublic transport services some 200 miles from the collection centre to be so low as to nder an artificial insemination service, based on fresh-cooled semen, impractical at such stances.

In a six-week trial carried out in November-December, 1963, 22 Mashona cows were seminated with deep-frozen Manguni semen from Msengezi. The cows were inseminated random to the four bulls represented by their semen. The semen, stored in liquid nitrogen, as not replenished during the trial. Seventy-three per cent. of the cows conceived to first semination and a further nine per cent. to second service. These results clearly suggest that) the deep freezing technique can be successfully applied to indigenous semen; (b) that a ntralized collection centre would need to base its semen preservation on a deep-freeze pro- edure in order to provide adequate service at more than moderate distance from the centre.

ATING BEHAVIOUR OF MASHONA-TYPE COWS

Little is known of the oestrus activity in indigenous stock. The opportunity was taken, conducting the previous trial, to record some aspects of the mating behaviour of the ows involved using vasectomized bulls and one entire bull as a control. Observations were rried out pre-dawn to nightfall on 25 females.

All but one of the cows showed first indications of heat from about 4.30 to 6 p.m. ypical symptoms were general restiveness—the animal coming on heat was frequently the rst to be walking around whilst the rest of the group were lying down; such animals ere disinterested in grazing and were usually seeking the bull. A varying number of ttempts to mount were made by the bull before a successful service was allowed by the ow. This first mating normally occurred some one to four hours after the first signs of heat ere observed, and the bulk of these first services were between 6 to 8 a.m. Up to five ubsequent services followed, the majority of final services occurring between 9 and 11.30, ith the maximum recorded "acceptance" period being about five hours. This may of ourse merely represent bull fatigue or disinterest, as in practically all cases the cow etained apparent interest in the bull until noon to 2 p.m., with one exception where the ow showed interest for approximately 24 hours.

The remaining female came on heat in the forenoon, and continued into the night. hese observations suggest that a much more detailed study of the oestrus period in indi-

genous stock is essential to the practical success of any possible future artificial insem nation programme.

Bulking and Selection of Sabi-type Sheep

The ewe flock was augmented by the transfer of 80 ewes from Tuli Experiment St tion, and the purchase of a further 15 animals, bringing the number of females availab to some 260. With these numbers, more critical work than has hitherto been possible planned.

Pasture Husbandry

Veld Grazing Trials

These studies seek to provide information on the effects of differential grazing practic on cleared veld in terms of (a) production (b) botanical aspects, especially tree regrowt

The treatments are:

GRAZING DAYS, GROSS YIELD, AND TREE REGROWTH, PER HALF-ACRE PLOT

Treatment	Grazing Days 7½ goats or sheep = 1 ox		Grass Yield lb. air dry grass		Regrowth count at start of 1963–64 season
	1963–64	Mean 1958–59 to 1963–64	1963–64	Mean 1958–59 to 1963–64	
1. Uncleared and grazed by cattle (control)	16·5	15·1	105	421	—
2. Cleared and grazed by cattle	93·7	105·3	719	1,099	69
3. Cleared, planted to star grass established with nitrogenous fertilizer, and grazed by cattle	63·3	81·1	754	1,116	99
4. Cleared, grazed by cattle and rested January to March in alternate seasons	79·5	80·1	620	904	131
5. Cleared, grazed by cattle, rested and burnt each third year	70·9	50·6	438	610	123
6. Cleared, grazed by goats only	40·5	72·2	549	906	295
7. Cleared, grazed by cattle, goats and sheep	74·7	80·3	746	1,225	78

The increase in the productivity of the cleared plots is marked. Burning does not appea to be any more effective in terms of regrowth control than grazing with cattle or mixe stock, but this may be a reflection of the small size of the plots. The outstanding botanica feature of the experiment, however, is the failure of the goats to eat Munondo regrowth Current trends would suggest that the productivity of the goats only treatment is declinin for this reason.

MATOPOS RESEARCH STATION
(including Nyamandhlovu, Tuli and Tjolotjo experiment stations)

Animal Husbandry Section

Beef Production Studies

Studies on the occurrence of a genotype-environment interaction within breeds and the extent to which these differences may be influenced by different systems of selection or varying planes of nutrition have been continued and now include second-generation animals

The slaughter data presented in Table 1 indicate that pedigree steers, whose sires are ed on the standards of breed perfection independent of the environment in which they oped, showed a marked improvement in 1964 over previous years but were, in fact, nferior in performance to the grade steers, whose sires are selected on the performance eir progeny.

TABLE 1.—SLAUGHTER DATA OF PEDIGREE AND GRADE AFRICANDER STEERS PEN FATTENED OVER AN AVERAGE 100-DAY PERIOD

57–63)	Grade Africander				Pedigree Africander				
	Grade				Grade				
	S	O	E	N	S	O	E	N	B
ntage of animals . . .	56·9	30·0	12·3	0·8	22·6	35·5	35·5	3·2	3·2
aughter liveweight (lb.) .	1,069	1,045	959	760	1,058	999	936	845	760
arcass weight (lb.) . . .	591	573	522	401	572	534	486	488	392
ing out percentage . . .	55·3	54·9	54·4	52·8	54·1	53·5	52·0	57·7	51·6

64)	Grade Africander		Pedigree Africander		
	Grade		Grade		
	S	O	S	O	E
ntage of animals	91·9	8·1	58·3	16·7	25·0
laughter liveweight (lb.)	1,189·3	1,161·7	1,119·3	1,067·3	975·0
carcass weight (lb.)	672·0	640·0	608·8	568·0	506·0
sing out percentage	54·8	53·4	52·8	51·6	50·3

In the teeth studies the nutritional aspects are considered concurrently with the genetical determining the influence of various levels of protein intake, minerals and, possibly, mins on the structural changes and eruption of the teeth of Hereford and Native cattle.

The two breeds were divided into the following four comparable groups:

(1) Control group.
(2) Calcium + phosphorus-supplemented group.
(3) Protein-supplemented group.
(4) Calcium + phosphorus + protein-supplemented group.

In this trial the following information is being collected:

(1) Weekly mouthing (noting eruption of teeth).
(2) Fortnightly liveweights.
(3) Monthly collection of blood samples which are analysed for—
    (a) inorganic blood phosphorus;
    (b) blood haemoglobin;
    (c) serum calcium;
    (d) total calcium.
(4) Three-monthly photography of teeth.
(5) Three-monthly body measurements of animals.
(6) Analysis for phosphorus and calcium in teeth.
(7) Analysis for phosphorus and calcium in saliva.
(8) pH of saliva.

From these observations it should furthermore be possible to determine the degree degeneration or improvement of indigenous and exotic animals under local environmental nditions.

The experiment in which a determination is being made of the extent to which en parasites adversely affect the general health and growth of cattle on various planes nutrition has been continued. The data, which includes faecal egg counts and larvae de minations by incubation of eggs as well as blood haemoglobin readings, seem to indi that any differences in liveweights which occurred between groups resulted more from feeding of protein than from the dosing treatments. These results could be subject to s degree of error in view of the extremely dry seasons which have been experienced over last two years.

Mutton Production

As an aid to selection for smooth-coatedness, microscopical studies on the coat cc of Dorset Horn x Blackhead Persian F_2 and F_3 crosses reveal a tremendous variation factors such as the ratio between the percentage hair and wool and the thickness of th fibres. Both these factors play an important role in the resistance of various coat co to the penetration of grass seeds.

It is evident from the experiments in which the effects of different pre- and post-na planes of nutrition on the breeding performance of the ewe and growth rate of the la are being studied that the physiological and bodily advantages derived from the treatm by the animals on a high feeding regime will have to be interpreted in the light of s factors as quantity and type of feeds used, optimum periods of feeding and costs of p duction.

Much controversy still exists over the question of which of the two seasons, autu or spring, is the best suited for lambing down. Past studies on the adverse effect of en parasites on spring-born lambs indicated that it could be successfully combatted by regu and judicious dosing but proved expensive. To its credit, however, is the advantage o better growing season provided the lambs dropped in the early spring.

In view of observations an experiment has been initiated to determine, both fr an economical point of view and from the performance of the ewe during her lifetime p duction, which of the seasons, autumn or spring, or possibly both, is or are the best sui for lambing down.

Dairy Research

During the course of the last year the dairy has been successfully changed to a u basis in which an accurate assessment of the relative importance of the different fact affecting milk production costs can be made.

Further analytical studies are carried out to determine the value of a green crop stimulating milk production and the secretion of non-fatty constituents to a level abo that which may be obtained from the use of conventional feeds in Matabeleland.

Agronomy Section

Dryland Agronomy

Rainfall for the season was well below average at 13.28 in. Moisture conditions for cr growth were only adequate for a short time after planting and the complete absence rain after February meant the season was one of the poorest on record.

Top yields of 10 bags/acre in the maize variety trials at Nyamandhlovu and Matop came from the very quick-maturing varieties like SA11 and Hazera 160. The nitroge phosphorus/spacing trial at Nyamandhlovu gave no differences in yield but at Matop there was a significant response of 1½ bags/acre to a dressing of 400 lb./acre of sin superphosphate. In this very poor season the high populations (14,520 plants/acre) ga the same yield as low populations (7,260 plants/acre). At Umgusa a trial to compare varic insecticides for the control of maize streak vectors showed that 10 per cent. Thimet reduc the number of infected plants but that there were no differences in yield.

Sorghum grain variety trials were very badly hit by drought at Matopos and Tjolot At Gatooma NK300A (a dwarf version of NK300), gave top yield of 27 bags/acre. spacing and seed-rate trials using Red Swazi responses were obtained to high seed-ra

lb./acre) and to close rows (7 in. between rows). A series of trials carried out by the artment of Conservation and Extension showed that the varieties tested gave different onses to seed-rates.

Millet grain trials were carried out for the first time for a number of years. At Tjolotjo yields were obtained from 14 in. and 21 in. between rows and low seed-rates. Matopos s showed no differences between spacings or seed-rates.

As an observation trial sorghums were grown on granite sandveld at Matopos. The ts grew well and yields at 8 to 10 bags/acre were as good as maize and better than et. There was no response to fertilizer dressing ranging from 0/0/0 to 100/80/60.

Trials with cash crops were badly affected by drought. Results in seasons such as this light the difficulty of introducing cash crops into the farming systems of Matabeleland. ds from the soya bean trials were less than 3 bags/acre and only a few of the quicker uring varieties like Masterpiece, 56S122, 54S116 and N52S214 gave this level of yield. ds from the sunflower variety/spacing trial were about 9 bags/acre with only small erences between varieties and spacings.

In the maize silage trial best yields came from the later-maturing variety but there no increase in yield by cutting 30 days after tasselling instead of 10 days. Sorghum ge seed-rate trials gave linear increases in yield up to 28 lb./acre and the spacing trials wed that 28 in. between rows was the best spacing. Millet silage fertilizer trials showed ons/acre increase in yield with the use of 400 lb./acre single superphosphate under irri- on and 4 tons/acre under dryland conditions.

GATION AGRONOMY

Data from the lucerne moisture trial was analysed during the year. Results from the l showed that the optimum E_t/E factor to use on this soil is 0.8, provided that care is en to prevent waterlogging by over-irrigation during the rains.

Lucerne variety, variety/spacing and variety/seed-rate trials planted in March, 1963, e harvested throughout the year. Up to nine cuts were obtained from the best varieties ing the period September, 1963, to May, 1964. Best yields were over 14 tons/acre of matter. Differences between the various spacing and seed-rates compared were not large.

NT BREEDING

The first two synthetic varieties of maize produced by the programme started in 1957 e available for testing in maize variety trials. The object of this programme is to produce ynthetic variety superior to the present open-pollinated varieties for use in African areas. the two synthetics tested, one, Kroonstad Robyn, proved superior to the original open- linated, while the other American White Flint was inferior.

OP ECOLOGY

Growth analysis studies were done under dryland conditions where stress was severe. a result of examination of past records it has now been decided to combine growth lysis and soil moisture work under dryland conditions so that quantitative effects of soil isture stress on plant growth can be measured.

A hydraulic lysimeter on the design of Glover and Forsgate of E.A.A.F.R.O. was con- ucted during the year. After numerous delays, mainly due to the bolster construction, the ks were finally brought into use in July, 1964, when a crop of oats was planted to cali- te the tanks.

SCELLANEOUS

A trial to compare various strains of soya bean inoculants was carried out as part of a ional programme for Grasslands Research Station. Owing to lack of moisture, modulation s poor and yields of both hay and grain were very low.

As part of the agricultural research programme a trial to test whether there is response sulphur on virgin sandveld was started. This trial is due to run for three seasons with crop rotation of maize/cow-peas/maize. Yields were, of course, very low due to the

drought but indications were that there was a slight depression in yield with the applica of sulphur.

Plant-height trials were carried out again. This season the trials were extended in or to examine how far the effects found in 1962–63 would extend in an eight-row plot. Un tunately the effects of drought badly affected the yields of these trials.

Pasture Research Section

At both Matopos and Tuli the veld management experiments have been severely affec by drought during the past year, but at Nyamandhlovu, although less than normal rain was recorded, grazing has been reasonably good and water supplies have proved adequ. It has, therefore, been possible to graze 128 head of cattle, from Matopos and Tuli, Nyamandhlovu for most of the dry season.

The first part of the year was devoted to the calculation and tabulation of basal co percentages in the burning, isolation-transect, and seasonal-grazing trials from the charts point-quadrat counts made earlier in 1963. Altogether, 890 charts and 96 point-quad (1,000 points each) were processed.

A great deal of time was occupied by a thorough examination of the cattle-weight c which has been amassed since 1950, especially data from stocking-rate trials. Where possi the weight gains were subjected to statistical analysis. The results confirm the impressi already gained that gains per steer are not greatly affected by variation in stocking r (except during drought) and that gain per acre decreases as stocking rate becomes ligh The results also show that the steer is a very misleading indicator of veld condition.

The latter part of the year has been taken up mainly in the preparation of sections the pasture research paper now being compiled.

Matopos

Veld Management

It has been the practice for some years to supplement the diet of steers in the exp mental paddocks with a protein concentrate when weight losses become critical. Graz pressure is, therefore, maintained, but animal data have to be disregarded during peri of feeding. The usual practice is to provide 2½- to 3-year-old steers with 1½ lb. coton-s meal/head/day after they have lost 15 per cent. of their body weight. Three-and-a-half 4-year-old steers receive 2 lb./head/day of the concentrate after a 20 per cent. loss of weig During the present dry season, however, it has been necessary to remove some animals fr the paddocks altogether because all grass has been consumed.

During the 1963–64 summer steers in the veld management trials behaved normally reached their peak weights slightly earlier than usual—in most cases on 6th May. Th have, however, been subject to considerable stress during the present dry season, anim on the sandveld, where only about 9½ to 10 in. of rain fell, being hardest hit.

In the sandveld four-paddock, three-herd, stocking-rate trial where overall stock rates vary from 1 : 5⅓ to 1 : 18⅔ all animals were receiving supplementary protein by Septe ber 24th as all had lost 15 per cent. or more of their body weight by that date. The ca in the heaviest stocking rate (1 : 5⅓) had consumed all the grass in their paddocks by Ju and were removed from the trial. The 1 : 8 paddocks are now grazed very short and even very unpalatable *Loudetia flavida* is being closely cropped. The animals in this treatment ha received supplementary protein since 31st August and, unless good rains fall soon, will a have to be removed from the trial. It became necessary to supplement all other groups 14th September, although at the two lightest stocking rates there is an abundance of gra This stresses the fact that quality, rather than quantity, of grass dictates liveweight respon and emphasizes that animal performance is a poor indicator of whether or not veld correctly stocked.

On the thornveld, where rainfall for the season varied from 11.71 to 13.59 in., ca have also done badly during the dry season but have performed considerably better than the sandveld. On bushed black soils in the thornveld supplementary feeding is not

ssary, even at stocking rates as heavy as a beast to six acres, but on the red soils e at stocking rates of 1 : 7½ and heavier are now being fed. Also on these soils, one icate of a 1 : 10 continuous grazing treatment is now receiving supplementary protein. s, however, apparent that all treatments involving stocking rates in excess of 1 : 10 are sing considerable damage to the useful perennial grasses. Even *Cymbopogon plurinodis*, extremely unpalatable grass, is being heavily grazed at rates of 1 : 6 and 1 : 7½, and *meda triandra*, another unpalatable species, is being freely taken up to rates of 1 : 10. Harvester termites (*Hodotermes* sp.) have competed strongly for grass with cattle this r, not only in the veld management trials, but throughout Matabeleland. Although no res are available it is obvious that these insects must have cost the cattle industry many usands of pounds during the past 12 months.

Plant Succession

In the seasonal grazing trials considerable differences in species composition now exist ween treatments. On the thornveld, grazing every summer for 16 years has reduced the ginal perennial cover, dominated by *Themeda*, *Cymbopogon* and *Heteropogon*, to *Brachia eruciformis*, *Eragrostis patentipilosa*, and *Digitaria nemoralis*. Grazing for the whole r except the second half of the dry season has brought about a similar change although *agrostis* has not invaded so strongly. Grazing for the second half of the growing season y has resulted in a low basal cover but most perennial species still persist, whereas zing for the first half of the growing season has induced a very high population of *agrostis patentipilosa* but basal cover has remained comparatively high.

In the sandveld *Sporobolus* spp. and *Eragrostis* spp. have increased with grazing throughout the summer or for the first half of the season at the expense of *Trachypogon spicatus* d *Elyonurus argenteus*.

Bush Control

The burning experiments continue to show that while a good cover of perennial grass n be maintained by burning at the end of the dry season once in three or four years, e perennial grasses are rapidly replaced by annuals if burning is too frequent or if it takes ace too early in the dry season. Burning effectively prevents the establishment of woody nts provided the grass cover remains vigorous, but has only a slight effect on existing sh. Young trees, although not often killed by fire once they are well established, usually not increase in size (and are often reduced) by judicious burning once in three or four ars.

In this connexion it has been found that three counts should be made between about ptember (when they come into leaf) and December. By counting at this time of the year e annual flush of seedlings, most of which do not survive, is avoided and only reasonably ell established plants are counted.

One new chemical bush control trial was put down during the year but no results are vailable yet.

Goats continue to impress as agents for the control of *Acacia* spp. When run with cattle tal production of meat produced per acre is considerably more than when cattle alone re run.

Veld Fertilizer Experiments

Experiments in which various amounts of N and P are applied to veld in summer and ne grass harvested at intervals during the dry season were continued for the third year nning. This year, the drought caused a reversal of previous results in that dry matter yields rom the thornveld were appreciably lower than from the sandveld. On both veld types ields were much lower than in the preceding two years, though, as in previous years, yields ncreased as the amount of N applied increased. Responses to P were more erratic and ere generally small. N x P interactions occurred in all harvests on the sandveld and in two arvests on the thornveld. General indications are that yields were greater when both N and were applied together than when either was applied alone. The greatest yields obtained were of the order of 1½ tons per acre.

NYAMANDHLOVU

Veld Experiments

Stocking rate trials.—Steer weight changes and botanical observations have shown t when overall stocking rates are greater than one animal to 15 acres in a four-camp, th herd system of management on the sensitive red soil veld, both veld and animals are seriou affected.

Ecological trials.—In the dense "gusu" fringe woodland, the plots cleared of bu yielded 1,403 lb. oven-dry material per acre (116 per cent.) more than the uncleared pl Excavation of the root systems of seven tree species growing in the same commun revealed considerable differences between some species. Tap roots were common and lateral spread of roots was usually twice to three times the height of the tree and mo on the southern side. A widely spaced pin-point survey of the ecological trial on the soil veld showed only a small range in the basal cover, 1.38 per cent. to 3.88 per ce Complete protection and the burning every five years produced the lowest cover but annual burns during autumn and before any rain had the greatest proportion of less de able grasses.

Chemical Bush Control.—The present technique of counting the annual growth of sho in herbicide screening trials on the poisonous plant *Dichapetalum cymosum* is no long considered adequate. A long period of counts and recent excavations have suggested th some seasonal growth condition has a greater effect on the growth of shoots than t herbicides. The appearance of shoots in an abandoned farm land and their subsequ excavation has shown that annual cultivation (nine seasons in this instance) can elimina the horizontal part of the stem system but does not greatly affect the vertical part. Poiso ing of the vertical parts is in progress.

The preliminary results from a base of stem spray trial on short *Acacia nilotica* sugge that the species is more susceptible to oils and herbicide mixtures applied during Octob than during January.

Clearing Bush for Grazing

Ringbarking.—Ringbarking has proved very effective on well-grown trees of *Aca nilotica* and when combined with October fires or the later plucking of coppice shows sig of being effective on all but a few of the woody species growing on red and black soil.

Stumping.—The cost of stumping well-developed "gusu" margin woodland was halv when larger stems were left. The presence of large rootstocks below most stems, created previous cutting made the task of clearing long reverted native lands considerably mo difficult than was originally anticipated.

Crop Experiments

Two maize experiments on "gusu" sand and two sorghum experiments on basalt we carried out for Field Husbandry, Matopos. A time of planting trial with Turkish tobac was also done for the Tobacco Research Board.

TULI

The severest drought for many years was experienced this year and on the pasture blo the various guages recorded from 5.91 to 7.91 in.

Veld Management

The year should have been an excellent one for the comparison of cattle performance c cleared and bushed veld. Unfortunately harvester termites invaded the cleared experimen so seriously that it became apparent early in the dry season that if control measures we not taken, no grass at all would remain. The paddocks were, therefore, destocked in Jul and sprayed with a Dieldrin compound. Although it is obvious that this has reduced th termite population very considerably observations are still being carried out to determine t what extent (if any) colonies have escaped the poison. During 1963 the same paddocks we baited with chopped grass poisoned with sodium flousilicate. The results of this operatio were disappointing, and it is to be hoped that the latest attempt will be much more successfu

Although a full year's comparison of cattle performance on cleared and uncleared veld erefore not possible, the data in the following table is of interest:

	Stocking rate	*Average weight per steer (lb.)* 26.9.63	25.6.64	*Average gain/head*
hed veld	1:15	484.3	622.8	138.5
	1:20	490.7	637.0	146.3
	1:25	491.2	735.8	244.6
	1:30	522.5	842.7	320.2
ared veld	1:7½	490.7	778.0	287.3
	1:10	522.2	860.0	337.8
	1:15	491.0	793.7	302.7
	1:20	493.2	833.3	340.1

All the animals illustrated in the above table were nine months old in September, 1963, l it is very clear from the table how great an advantage may be obtained by clearing h in the lowveld, provided this can be done reasonably cheaply. The two heaviest stocked atments in the cleared belt have only recently been stocked (1 : 10 in February, 1963, and 7½ in September, 1963), and as the paddocks were well grassed before cattle were intro- ed the weights reflected are possibly rather unrealistic. All other paddocks have been cked for 10 years or more.

Stocking rate has been all important during the year and cattle from all but the most atly stocked treatments have been removed owing to lack of grass and browse. These ve been sent to Nyamandhlovu where grazing is reasonably good. The first paddocks to destocked were the 1:10, 1:15 and 1:20 treatments of the two-paddock system which oke down on June 26th when all available browse had been exhausted. The steers involved re two and a half years old. On August 6th, 18-month-old steers had to be removed om the 1:15 and 1:20 treatments of the three-paddock (bushed) system, and on the same y 3½-year-old steers from the 1:20 treatment of the four-paddock, three-herd trial were moved. The cattle remaining in this trial were removed for slaughter on August 13th and e paddocks were not re-stocked. It is unlikely that any treatment stocked more heavily an 1:30 will survive the dry season.

Bush Control

In the goat trials, greater than normal control of woody species is being obtained this ar and much of the scrub Mopane and *Grewia* spp. will be killed to ground level as the oats are stripping all accessible stems of bark. Many of the plants are likely to be killed tirely. Ringbarking has been shown to be a practicable method of killing many lowveld ee species.

ree Root Studies

Work on the excavation and measurement of tree roots continues and some interesting ter-species comparisons are being obtained.

Chemistry Laboratory

The vacant post of technical assistant was filled in February and since then the laboratory as functioned well. In the last eight months 1,356 samples have been analysed. Most of ese have been crude protein determinations, blood samples for haemoglobin content or ill-feed analyses.

Poultry Section

With the Poultry Officer's post vacant for the whole year only a few birds are being ept for trial purposes.

The trials are: The effect on production of hybrid-type commercial birds using various ghting and segregation patterns, and which involve five teams (pens) comprising a total of 00 birds.

The National Random Sample Egg-laying Test is proceeding satisfactorily. The en for the second N.R.S.E.T. which are, for the first time, being reared in identical conditi involving 300 birds, is proceeding according to plan.

VETERINARY

A batch of 600 unsexed Rhode Island Red, infectious bronchitis-free birds were sta in the experimental unit building. Of these, 302 pullets were retained for use in a v experiment conducted for the Veterinary Department. The trial is under closed conditi and is expected to continue until April of 1965. Unwanted males from this exercise have b sold.

TJOLOTJO EXPERIMENT STATION

A rather poor rainy season (15.80 in.) was followed by a very severe winter. One ni during June 19.5 degrees of frost was recorded and frost was also recorded on many ot occasions.

Crop Husbandry

Crop yields were low. These were as follows:

Sorghums (Early Hegari)	6.8 bags/acre.
Groundnuts (Spanish Bunch)	825 lb./acre.
Silage (Sweet Sorghum)	3.57 tons/acre.
G.4 Cowpea hay	2.1 tons/acre.

Field Trials

Ten trials were conducted for the Agronomy Section or for the Agricultural Resea Council.

Animal Husbandry

The indigenous herd now numbers 545. The cattle have performed well during the y and appear to have more than maintained weight during the dry season on a liquid ure molasses lick. Calving rate for 1963–64 was 91.3 per cent. and for 1962–63 was 85.4 p cent. Average livestock weights were as follows:

	Birth weight	*Weaning weight (7 months)*	*Weight at 12 months*	*Weight at 24 months*
Males	66	403	582	898
Females	59	376	506	751

In order to determine the dominance of the inkone pattern three inkone-marked bu were mated to cows of the following colours: inkone, 47 per cent.; roan, 12 per cent.; r and white, 13 per cent; white, 8 per cent and red, 20 per cent. Of the calf crop 73 p cent. had typical inkone markings.

Ten bulls were sent to Makoholi for performance testing. Tests showed a mean dai gain of 1.94 lb., mean efficiency of 5.49 lb. and a correlation between gain and feed efficien of 0.98.

The demand for breeding stock is increasing and a number of bulls, heifers and cov have been sold to ranchers or transferred to other Government institutions.

At the Wankie Show 11 first prizes and five seconds were won and both the inter-bree groups were won by Tjolotjo inkones. In addition the following championships were wo beef female, slaughter animal, indigenous bull, indigenous female and champion carcass.

Only a few animals were entered for the Bulawayo Show, where they won two first three seconds and a third. A milk-tooth bullock won a third prize in the carcass competitio

RHODES INYANGA ORCHARDS

The outstanding feature of the year's weather was, as in most of the country, the ver poor rainy season: the lowest total in fact since records began at the station.

Lay opinion that the winter was the coldest ever is not supported by station record though it is true that the night of the 28th June was indeed the coldest on record, with

ound minimum of 7.2°. On the other hand the total number of frosts has frequently been ceeded and was in fact less than average.

The anemometer records reinforce the view that very high windspeeds (i.e. over 300 n.p.day) are not of common occurrence, and that it is the winds averaging 200–300 m.p.day hich are probably responsible for most of the distortion of fruit trees. During the months f September to December, 1963, when peach trees were at their most vigorous and the young oots not yet hardened, such average speeds were recorded on one day in three.

Two meetings of the Growers' Liaison Committee were held during the year, Mr. J. E. rosthwaite-Eyre was chosen to fill the vacancy left by Mr. J. Y. C. Thomson. The Research ubcommittee met on three occasions.

Two newsletters were circulated to growers and other interested persons and bodies. A st of references to deciduous fruit growing in Rhodesia and Malawi was compiled. This s now being revised and amended for cyclostyling.

Development of the soil fauna work has been hampered through lack of suitable equipment. Some headway has however been made with apparatus made on the station by the arm manager. A picture of the soil fauna of old orchards is gradually being built up, and vith a supply of electricity in the near future, this work should be accelerated and intensified.

Work on the main 9-in. pipeline from the Mare Dam was completed in March, and the eticulation of 6-, 3- and 2-in. underground mains in the orchard have been carried out so hat by the end of the year it was possible to irrigate most of the experimental area by means f sprinklers. Comparative tests of various commercial sprinklers under windy conditions vere begun in September.

Trials Planted in 1962

Peach Management Trial

Growth generally was good, and uniform, in both varieties, Culemborg and Kakamas. Monthly trunk girth measurements were made on a random selection of 48 trees (one-quarter of the experimental trees) from mid-November onwards. No great differences were seen in the growth patterns of the two varieties, but these may show up in future years when picking of Kakamas will be about two months later than Culemborg. Although some girth increase was recorded during March-May, about two-thirds of the total growth took place before mid-February.

The mean girth increase for the season of all experimental trees was 3.8 inches, and the mean leader extension 43.3 inches.

In a few plots, the mean leader extension exceeded 50 inches. These were not in all cases those with the greater girths.

The prevailing wind caused considerably more distortion on Kakamas than on Culemborg. In the latter, the distortion is not considered so serious as to affect pruning practices. In Kakamas on the other hand, leaders arising on the east-south-east side of the trunk have in many cases been so severely bent that their tips were three or four feet over on the north-west side by the end of the growing season. This may mean that in future years suitable laterals may have to be selected to replace the tops of the original leaders.

Flowering of both varieties was very profuse and the set was heavy, so that very severe thinning was necessary to reduce the crop to a potential 8–10 lb./tree.

The differential nitrogen, cultural and irrigation treatments are to be imposed in a few months' time.

Apple Management Trial

In February the first case (on the station) of death from *Armillaria melles* infection was diagnosed in this trial and since then several more deaths have occurred. It is difficult to know the origin of the infection since some of the dead trees are a long way from old windbreak sites; it may have come from clumps of *Buddleja salviifolia* which were common over the whole area prior to 1962.

A considerable number of additional cases of apple mosaic infection has been discovered in the course of routine inspections. Growth within varieties has varied a great deal, as the following table shows; trunk girths at this stage are too small to be used with any accuracy.

AVERAGE TOTAL EXTENSION GROWTH IN INCHES
(means of six trees: experimental and guard rows)

Variety	*Ohinemuri*	*R.I. Greening*	*Starking*	*W.W. Pearmain*	*Canvada*
Average of all 36 plots . . .	201	113	143	90	237
Poorest plot	108	69	59	37	161
Poorest plot as % of mean .	54	61	41	41	68
Best plot	343	206	276	199	309
Best plot as % of mean . .	171	182	193	221	130
Range of plot variability as %	117	121	152	180	62

From these figures it will be seen that not only was Canvada the most vigorous grower but also the most uniform. The five varieties have now maintained the same order of vigour for two seasons.

The intention of using a summer legume as one of the soil management treatments was abandoned, mainly because no suitable species could be found for the purpose, and a mulch treatment has been substituted. This, and other differential treatments, is being imposed during the 1964 65 season. Veld grass as a mulching material on an 8-ft. square by 6-in. deep, for each of the 300 trees, means about eight tons of dry grass has to be cut and transported from a site several miles from the station.

The permanent sod treatment will consist solely of Richmond (*Digitaria diversinervis*) to be planted about November/December.

To reduce the labour of hand weeding in tree basins, in this and other trials, paraquat spraying has been practised. Although expensive, and only partly effective, this will be continued at more frequent intervals in 1964–65, unless the labour position improves.

Hose irrigation commenced towards the end of August. Some gypsum blocks had been installed by this time, and instrumentation for the whole trial (blocks and thermometers) should be completed by the end of 1964.

Apple Screening Trial

Tables have been compiled showing the total extension growth during the nursery years and 1962–63 and 1963–64 growing seasons in the field, of all 38 varieties in this trial. These show the relative vigour on Merton 793 and indicate that comparatively few varieties maintain the same vigour each year. Some, such as Stark Earliest and R.I. Greening have so far steadily improved their positions, others like Beauty of Bath, are rapidly declining, while a few, such as Granny Smith, appear to undergo alternate good and bad years. It will be interesting to observe in future (cropping) years, whether the latter phenomenon is associated with biennial bearing. Early McIntosh has made the poorest growth each year and unless it is found to perform very much better on some other stock, cannot be recommended as a commercial variety.

Two varieties, Laxton's Superb and Sykehouse Russet, are markedly distorted by the wind. Staking of all trees has been justified as can be seen by the effect of a moderately strong wind on any tree with a reasonably dense crown; without stakes they would have suffered badly from wind-rock and many could have been blown right over.

Trials Planted in 1963

Apple Nutrition Trial

Treatments in this trial are being imposed in the spring of 1964.

Apple Pruning Trial

Normal vase-type framework of leaders will be encouraged until treatments are imposed at a later stage.

Apple Screening Trial

No losses occurred in any of the 53 varieties planted, although some cases of mosaic were discovered. Thirty-eight varieties failed to produce the somewhat arbitrary minimum requirements of 65 in. total extension growth, including Gravenstein, with a total of 53 in., though this variety is now putting on vigorous growth, showing the inadvisability of making judgments until apples have been planted in the field for at least two seasons.

Initial training in the palmette plots will begin during the summer of 1964.

Trials Planted in 1964

Apple Screening Trial

A total of 57 apple varieties, three trees of each on Merton 793 stock, were selected from the 100-odd varieties propogated in 1963. Reasons for discarding the remainder were mosaic infection and insufficient growth.

This brings the total number of varieties planted out in the apple screening trial to 147. At least one variety is being duplicated in successive seasons in an attempt to provide some sort of "overlap".

Peach and Plum Screening Trials

Stone fruit variety trials rank high on the priority list for work on deciduous fruit. Accordingly suitable land was selected and planted with 60 peaches and 24 plum varieties on peach seedling and Marianna stock respectively.

Phenology Plot

A small piece of land in an exposed position has been planted with 16 trees each of Golden Delicious and Starking on Merton 793 stock. These trees were selected for uniformity from a batch of about 100 of each variety imported from South Africa.

As the name implies, observations and measurements will be made of time of bud burst, rate of shoot extension, leaf fall, and ultimately of blossom period, rate of fruit growth and ripening under the prevailing climatic conditions, i.e. effects of climate will not be altered by the application of DNOC sprays.

Apple Planting Trial

There has been considerable discussion as to the corect height to which maiden apples should be pruned back at planting time. This is a small trial to compare the effects of cutting back to 15, 20, 25, 30 and 35 in., using the varieties Golden Delicious and Starking. It seems as though lack of uniformity of planting material (due to drying out of, and damage to, buds in transit) may limit the usefulness of the trial.

It is not intended to continue this trial for more than two seasons, but the planting may be thinned and used for a "look-see" comparison of grass and sawdust mulches.

Raspberry Management Trial

A few years ago, raspberries were being grown on a commercial scale in the Inyanga area. Because of the rapid falling off in cane size, and hence yields, the crop is no longer grown on any scale. To investigate the cause of this decline, which does not appear to be of virus origin, a small trial was planted this year using the varieties Lloyd George and Malling Promise. Different methods will be used to control excessive sucker growth which, it is thought, may be connected with the reduction of fruiting cane height.

Nursery Work

Merton 793 stocks were propagated in stool beds and used for about one-third of the screening trial and other grafting carried out in September, 1964. The remaining two-thirds were imported from South Africa. Apples propagated for the screening trial this year included about 100 varieties recently introduced from South Africa, and about 50 "old" varieties

not previously grown on this stock. In addition 150 Winesap and 30 Tropical Beauty (e Queensland) were grafted for distribution to growers in various parts of the country to asse their general suitability.

In the latter connexion it may be mentioned that this year, raspberry canes have bee distributed to Conex officers in the Rusape and Macheke areas, and strawberry runne of several varieties to a grower in Umtali. Apple trees have also been sent to Machek while large quantities of apple scions (mainly of the newer varieties) have been distribute to growers in the Eastern Districts and the Bulawayo area.

A few seeds of "Okinawa" nematode-resistant peach, brought back from the U.S.A by Dr. J. O. Whiteside, were stratified and sown in pots. Some of these germinated ar are now growing well in the propagation house.

Only about 50 per cent. of the blackcurrant seedlings have survived their first ye in the open ground. Losses appear to be due mainly to excessive drying out during th winter. Baldwin blackcurrants introduced as cuttings in 1962 have not fulfilled their ear promise, growth having fallen off considerably this year. Bushes which were not cut bac in the winter of 1963 have performed slightly better than those which were. Red spid mites on the currants have been controlled with Tedion sprays. European gooseberri introduced at the same time are thriving, the best variety from the growth standpoint bei Lord's Seedling, which has also produced a few fruits.

Blueberries have continued to flower profusely and grow badly despite the mulchir begun last year. Recent Canadian work suggests that the varieties imported may possib require a long photoperiod for adequate vegetative growth. If this fruit is worth further wo it would be desirable to import varieties known to require a daylength of about 12 hou

The various hybrid berries imported several years ago are still in virtual quarantir because of serious nematode infestation. Attempts to tip layer these plants have met wit varying success, some layers will shortly be planted out in the open. The infested moth plants will be destroyed at the end of the current season.

Diseases and Pests

Attempts were made nearly two years ago to transmit the flat limb symptoms observe on the apple Missouri Pippin to the recognized indicator variety for this disease, Grave stein, by budding. Although most buds "took", no growth whatever took place. Recentl therefore, scions of Gravenstein were grafted on trees of Missouri Pippin exhibiting th disorder.

Maiden trees of the apple Red Normandie showed symptoms remarkably similar t these produced on one-year-old wood on Cox's Orange Pippin. These will be watched wit interest.

A few fruits bearing the quite striking symptoms of apple ring spot disease were foun on one Granny Smith tree in an old orchard. Care will be taken not to propagate from th tree and a search made for similar symptoms in all trees of this variety.

A single shoot of the variety Cleopatra produced, instead of the normal (apple) lea and bud arrangement, an almost continuous spiral of leaves and buds over a length of abou one foot. It is thought to be an unusual type of fasciation which might conceivably giv rise to sports.

Snout beetle population reached real pest proportions for the first time, both on th station and a neighbouring farm. The use of wattle pegs which split badly—providing shelte for the beetles—for various purposes such as stakes, tends to make control more difficult.

Miscellaneous Crops

The Potato Breeder, Mr. T. de Carvalho, has visited the station several times durin the year, mainly in connexion with the selection and testing of a new "foundation stock site, about one mile east-south-east of the present Mare Dam plot, which has been le to the station by the Inyanga National Park. The site, which is about 10 acres in exten has been tested for root knot nematodes, with negative results and is currently being fence

greenhouse to accommodate plants for virus testing of the foundation seed is to be built ortly near the main station buildings in time for the 1964–65 season.

The variety and seedling collection at the Mare Dam plot has been maintained, and id out of potatoes sown to Weeping Love grass.

Pyrethrum plots in the nursery have been maintained under irrigation when necessary. owering was almost continuous from late August until severe frosts occurred in June, the ly break occurring in January, at the height of the rains. Splits are to be distributed interested growers during the 1964–65 rainy season.

New Zealand Flax has continued to grow well. Thirty clumps of the original (1961) anting were lifted and split in mid-December. The resulting fans were size graded and anted out in a propagation observation plot.

Participation in the national soya bean rhizobium trial was reluctantly abandoned in id-season due to pressure of other, strictly horticultural, work, and an invitation to par- ipate in further work with this crop has had to be declined.

SABI VALLEY EXPERIMENT STATION

Over the past five or six years, by concentrating largely on the agronomic and water quirement investigations, considerable progress has been made towards finding solutions fundamental crop management problems under irrigation and in obtaining precise infor- ation on the consumptive use of those annual crops of immediate economic importance, amely cotton, wheat, seed beans and maize.

Summer and winter weather conditions during the year were favourable for crop roduction and experimentation under irrigation. Spectacular yields of cotton, wheat and eans were obtained and crop consumptive use investigations yielded valuable and con- lusive information.

Interest in the work on sugar cane was maintained, and as in previous years, considerable uantities of improved planting material were supplied to the commercial concerns and to ndividual sugar planters.

A comparatively hot and dry summer season was experienced, during which evaporation ates and sunshine hours were substantially higher than those recorded for the previous year.

Crop growing periods were favourable for cotton, bringing the crop to maturity some wo to three weeks earlier than usual, but proved rather severe for maize, particularly the hort-season varieties, resulting in yields somewhat lower than expected.

The winter season was noticeably colder and longer than normally experienced and as a esult there was a delay in the maturity of the cereal crops by some two weeks. Below- reezing temperatures were recorded in June and July, but apart from the bananas, the winter crops of wheat, barley and beans appeared in the main to be unaffected.

Cotton

Favourable weather conditions and adequate insect control resulted in a very satisfactory and high overall average of 4,100 lb. seed cotton from variety Albar 637 grown under standard management.

A district trial, planted on behalf of Gatooma Research Station testing 16 locally selected lines, averaged 4,196 lb. seed cotton per acre, with a top yield of 5,134 lb. seed cotton from strain S59/190; seven lines, as indicated by the trial, proved to be higher yielding than the commercial Albar 637.

An investigation into cotton nitrogen requirements following cropping revealed a linear yield response up to 100 lb. applied nitrogen per acre, whereas after a two-year grass ley, which presumably induced a soil nitrogen deficiency, a marked response was obtained from the higher level of 160 lb. N. In this connexion, a study of cotton fertilizer trials conducted since 1960–61 indicated that the optimum range of nitrogen application lies between 60 and 100 lb. N per acre, and highest economic returns are likely to be obtained by fertilizing within this range regardless of rainfall season. In wet seasons the optimum appears to be in the 60 to 80 lb. range, whereas in dry seasons marked responses can be expected up to the

100 lb. N level. The application of nitrogen in excess of 80 lb. per acre may result i excessively rank cotton which introduces spraying and harvesting problems; even at th 80 lb. N level cotton growth can be excessive in wet seasons or when over-irrigated.

Further studies of plant spacings and populations showed no significant yield an plant size differences, and from an examination of all recent data it was concluded tha the standard station practice of spacing cotton 3½ ft. by 1 ft. is satisfactory, and that nothin would be gained by changing to closer spacings and/or higher plant populations.

An observation area of "ratoon" cotton cut back in various ways in late Septembe recovered rapidly and in five months yielded at the rate of well over 3,000 lb. seed cotto per acre, which compared very favourably with the return from adjacent cotton raise from seed. Insect pests were kept under control during the winter by weekly spraying. A practical limitation to adopting the ratooning of cotton would be that the crop, ripenin early in the season, might be subject to much rain damage; retention of the cotton cro of course precludes the growing of a winter crop on the occupied land.

Maize

Yields in general, and in particular of short-season South African hybrids, were dis appointing, due probably to the somewhat severe climatic conditions experienced. A variet trial testing 36 varieties from very different sources yielded an average of 23.8 bags grai per acre, the top four yields of over 30 bags being reaped from Salisbury Experimen Station material. The low yields of certain varieties were largely due to their inability t produce a mature cob on every plant, and it is difficult to believe that the reason for thi is entirely climatic.

A spacing and nitrogen trial conducted on the South African short-season variety SA5 revealed no significant yield differences between the range of row spacings studied. There was a significant interaction between nitrogen and row spacings however, which showed that although wide rows (at 12 in. in-row spacing) gave improved yields over narrow rows at the nil and 80 N levels, the narrow rows (down to 2 ft. at the same in-row spacing) were superior at the high nitrogen level of 160 lb. N. An exceptionally high yield of maize for these conditions, namely 45 bags per acre, was obtained from plots planted at 2 ft. x 1 ft., fertilized at the rate of 160 lb. N per acre.

Soya Beans

In a time-of-planting trial, up to 17 bags per acre was obtained from November plantings. It is considered however, that even at this level of yield, soya beans are unlikely to prove an economic enterprise under irrigation, for example in competition with cotton.

A rhizobium trial conducted on behalf of Grasslands Research Station proved that seed inoculation is essential for high yields and indicated differential effectiveness of the inoculant strains presently available.

Kenaf

Some very heavy green weight yields, which may net over two tons of fibre to the acre, were obtained in a cropping period of four months from a kenaf variety trial planted in 6-in. rows.

Wheat

The field programme was confined to the screening of varieties and to the evaluation of crop/water use. Excellent wheat crops were grown and exceptionally high yields obtained due to the absence of stem rust, and to the fact that the main trials followed lucerne in the rotation. The colder weather and somewhat longer season may also have contributed to the very satisfactory yields.

A variety trial testing 25 strains selected for possible suitability to lowveld conditions indicated yield potentials varying from 13 to 22½ bags per acre, the average yield for the trial being 18.8 bags. The highest yields were obtained mainly from the more suitable short-strawed varieties.

Some 47 new introductions were examined, eight of which showed promise for further ting. Of these, variety S595 (Beardless) yielded at the rate of 30.8 bags per acre.

Barley

The standard variety, Sabi Atlas, showed an improvement in yield to close on 30 gs per acre under the more ideal conditions which prevailed.

Beans

The crop establishment procedure found satisfactory last season was again employed, mely, a deep planting of seed into wet soil some three to four days after an irrigation; s resulted in good emergence and the establishment of better stands than have been tained in past years. Yields generally were most satisfactory and proved to be the highest record.

A variety trial averaged 1,767 lb. per acre cleaned beans from 25 varieties, the highest elds being 2,478 lb. and 2,393 lb. from Red Canadian Wonder and White Processor spectively. These two types—the former suitable for internal consumption and the latter r export—have proved to be consistently high yielders.

In a variety, spacing and populations trial, which yielded heavily at over one ton beans to the acre, differences between main effects and interactions were not significant though a study of the data however showed a general tendency for yields to increase with crease in plant populations.

A re-examination of nitrogen requirements gave a significant linear response to fertilizer to the 200 lb. N per acre level. This finding does not conflict with previous results over e years which indicated increasing amounts from 40 to 100 lb. N as the maximum crop quirements, because improved irrigation management and higher plant populations have een used during the past four seasons.

Lucerne

Two experiments were put down in an area of lucerne established in June, 1963, the bjects of which were to compare the effects of sulphur, potash and trace elements and to xamine the effects of various levels of gypsum on soil productivity under lucerne. There ere no significant differences between main effects or interactions in the fertilizer trial, ut responses in yield to gypsum were significant up to the 500 lb. per acre application. It ould appear that a study of the use of gypsum as it may affect soil conditions for lucerne ultivation would prove a profitable line of investigation.

Sugar Cane

The cane nurseries were maintained, a number of new introductions established, and me observations and investigations made on varietal characteristics and suitabilities.

Chemical analyses were conducted and cane weights taken for evaluation purposes on 7 varieties in single three-line plots at the first ratoon stage, and a comparison made ith previous plant cane observations and results.

Little relationship was apparent between yields of the plant and first ratoon crops. part from varieties N50/211 (Salvo) and GB36/14, the ratoon yields from recent introduc- ions of considerable promise as plant cane, particularly NCo79 and Co462, were disappoint- ng; on the other hand certain of the older varieties, for example Co419 and Co331 gave onsiderably improved first ratoon yields. Of the present commercial varieties, CP29/116 nd NCo376 yielded at rates of 9.5 and 8.5 tons sugar per acre respectively; NCo310 emained fairly stable at about 7.5 tons sugar from both plant and first ratoon crops.

None of the six additional varieties evaluated as plant cane showed any particular romise.

Flowering was much more severe than previously experienced, varieties NCo310 and alvo being amongst the first to show arrowing which occurred early in mid-May. No lowering was observed in the plant cane crops of the more recent introductions.

No serious frost damage occurred, but lodging, which commenced early in the yea was particularly severe throughout, none of the varieties showing any tendency towar lodging resistance.

Much of the cane produced was supplied as planting material to the commercial co cerns and to individual cane farmers.

Rotation Trials

Previous reports have indicated a moderate but continued beneficial effect of the lucern on subsequent maize production but no residual benefit from the old rotation on whea following the maize. A critical review of all results from 1955–56 however, shows that a no stage were there significant differences between the six rotation treatments and that n rotation/nitrogen interactions were recorded, although results from nitrogen as such wer always highly significant. The results indicate also that crops immediately following th lucerne ley benefit considerably, thereafter declining in yield rapidly to about 80 per cen of optimum level, and it is concluded that uniform cropping since the lucerne was ploughed out in 1961 has probably stabilized the plots at a uniform fertility and structural level.

Crop Water Requirements and Irrigation Control

Crop water use and irrigation control trials were conducted on cotton, maize, bean and wheat, the irrigation treatments being determined by applying different factors to open pan evaporation and by assuming different rates of available soil water depletion. Soi sampling procedures were as described in previous reports, and the depths of water with drawal were determined by means of tensiometers and by gypsum and nylon blocks.

The irrigation control studies on cotton were similar to those conducted last season and were designed to investigate the effect on yield of reducing plant size by control o soil nitrogen fertility and available soil moisture supply. Due to the dry season experience it was possible for the first time in this work to assess accurately the effects of acute mois ture stress on the crop.

Four nitrogen treatments were combined with four irrigation control levels based on pan evaporation and determined by an increasing root penetration to 6 ft. for all treatments An intensive programme of soil moisture sampling was conducted on all four irrigation treatments at the 160 lb. N per acre level.

The optimum nitrogen level for this trial proved higher at 160 lb. N than determine for previous trials (60 to 100 lb. N), due probably to the soil nitrogen depletion brough about by the turning in of the grass ley shortly before planting the cotton.

Similar mean yields of about 3,500 lb. seed cotton, showing no significant differences were recorded from irrigation treatments which received 32.5, 20.1 and 18.7 in. of water in nine, six and five irrigations respectively, although the third treatment (five irrigations) was at one stage under severe stress. This stress period however, drastically affected the fourth treatment, which received 12 in. of water in three irrigations, and resulted in a 50 per cent reduction in yield to 1,800 lb. seed cotton per acre.

Data on growth habit supported observations made previously, and indicated that although both high nitrogen and excessive soil moisture resulted in rank growth and considerable lodging, this was influenced more by nitrogen level than by moisture status. Also, although the irrigation treatments showed no significant plant height differences, crop density varied considerably, the drier treatments producing plants of more upright habit allowing for easier crop management.

It was concluded from the results of this trial that cotton can withstand considerable moisture stress, even during the critical boll-setting period, without affecting yields detrimentally.

An experiment based on the standard pan evaporation irrigation schedule and designed to investigate the practicability of using the Gunn-Bellani radiation integrator for irrigation control in cotton, proved unsuccessful, due, it is thought, to a discrepancy which was evident in the calculated regression relationship between these two instruments. A reappraisal of

relationship will be required before the Gunn-Bellani instrument can be relied upon to vide accurate evapotranspiration estimates.

An irrigation frequency trial on beans tested four treatments consisting of combinations two pan coefficient values (0.7 and 0.3 E) and two levels of available soil moisture letion (50 per cent. and 75 per cent.). Yields of 1,851 lb. and 1,613 lb. per acre seed beans e obtained from treatments which received 12.8 and 10.6 in. of water in seven and five gations respectively, whereas substantially lower yields of 1,383 lb. and 1,092 lb. were orded from the dry treatments which received eight in. of water in four irrigations. These ults confirm previous findings that for optimum yields of beans, moderately but not excesly heavy irrigation schedules are necessary.

The water requirement experiment on wheat studied the same moisture regimes as for ns, and in addition examined the standard system of irrigation control based on current evaporation compared with a system of control using past mean evaporation data, it ing been observed that differences in seasonal evaporation rates are relatively small ing the winter months.

The two irrigation control methods proved to be very similar in the number of irrigas required and the total amount of water used, and showed no significant yield differes. The yields recorded varied from 20 bags of grain from eight to ten irrigations which lied about 27 in. of water, to 13 bags from the dry treatments which received 15 in. in ee irrigations.

The results of this trial indicate that irrigation timing for wheat during the winter son can be accurately determined from past weather data.

Laboratory and Soil Research

During the year under review, research efforts were largely concentrated on consumpe use measurements on cotton and wheat and on basic investigations into the performance d possible uses of a hydrodensimeter (neutron moisture meter) for moisture and density asurements in soil research.

Compilation of data on the physical properties of valley soils continued, and soil mples were taken and examined for moisture retention and bulk density in connexion with ar cane and coffee experiments at Chipinga Experiment Station and for advice on irrigion control in tea at Southdown Estates.

Commercial batches of gypsum blocks were examined and calibrated, and asbestos and ous plate tension tables were built for use in the study of the moisture retention of disturbed soil cores at low tensions.

Sugar analyses for variety appraisal purposes were conducted on three occasions prior the cutting at the first ratoon and plant cane stages of 51 sugar varieties established in main cane nurseries.

Further information on root development and on water extraction patterns for cotton d wheat was obtained from data provided by gypsum and nylon blocks and by tensioters. Significant water withdrawal occurred at 69 in. under cotton and at 51 in. in the e of wheat, and in no instance was differential rooting indicated under different irrigan treatments.

The hidrodensimeter depends on neutron moderation for moisture measurement and on mma ray absorption for density measurement.

Studies were made into the various sampling errors involved in the use of the instrunt including moisture and density calibration for a range of soil types, and investigations de into the seasonal changes under various types of vegetation compared with fallow, course of drainage in unsaturated soils and the effect of different crops and cropping soil density.

It was found that moisture measurements at three sites (using access tubes) gave the ne accuracy as obtained from gravimetric sampling at 12 sites, which observation was ted satisfactorily over a cropping period in the cotton consumptive use trial.

Moisture and density calibration curves, along with equations associated with th were determined; these remained generally stable on rechecking after altering the posit of the radioactive source. There was no apparent difference either in moisture or den calibration for the different soil types studied. It would appear therefore, that a sir calibration curve may be adequate for most Rhodesian soils.

Seasonal moisture changes were studied in sparse and dense Acacia veld, in stur Mopani, in open grassland on basalt and in fallow land which received different moist treatments. During the low rainfall season 1963–64 no wetting at any site occurred bee 4 ft. and in the open basalt area rainfall had not penetrated deeper than 9 in. by the end February.

Drainage studies in plots covered with plastic sheeting indicated that although colation below the root zone may occur in sufficient amount to influence consumptive results when the soil is near field capacity, such losses are insignificant at moisture conte only slightly less than field capacity.

A long-term trial investigating the effects of continuous grain, dahl and lucerne on density, started towards the end of 1963, fairly rapidly indicated the beneficial effects soil conditions of dahl and lucerne. It is thus apparent that the hydrodensimeter may h a useful application in measuring density changes in soils.

It is concluded that the hydrodensimeter can be used to advantage in many fields agriculture research, including agronomic problems such as crop water use investigati and seasonal changes in moisture storage, in pedological problems associated with land recommendations, and in soil physical problems which frequently require detailed kn ledge of soil moisture conditions.

AGRICULTURAL COLLEGES

CHIBERO AGRICULTURAL COLLEGE

Introduction

Satisfactory progress has been made during the year under review and, in particu there has been a pronounced and encouragingly wider appreciation, by Form IV Afri students, of the extent to which present-day agriculture offers satisfying and worthwh vocational employment to those with recognized qualifications, such as the college diplo

The College Council, appointed by the Federal Government, tendered its resignat with effect from the 30th November, 1963, and the Rhodesia Government appointed a n council, with Lord Acton, C.M.G., M.B.E., T.D., continuing as chairman. Altogether, th council meetings were held during the year under review, while the majority of councill attended the first college diploma day ceremony on the 29th July, 1964

The Field Husbandry Section

The college farm suffered, in common with many other parts of the country, fr the excessively dry season and although yields of most crops had definitely been depress they were still reasonable and, in some cases, set new standards of attainment for the coll farm.

The establishment of an orchard and vineyard has added further variety to the cropp programme. One acre was planted to various types of citrus, avocado, mango, and loquat, a grape vines, comprising seven different varieties. Water has been piped to the orchard, a next winter inter-cropping with irrigated vegetable crops will be considered.

In the tobacco section, experience gained over the last season has been put to good in making modifications to the buildings.

A permanent system of veld management has now been agreed upon with the st section, involving regular burning at suitable intervals, and rotational grazing and resting paddocks. The establishment of improved pastures has continued, and these now cover area of 45 acres of Katambora and Giant Rhodes grass.

Compared with previous seasons, yields of tobacco were higher, but prices lower, in non with the country-wide trend.

The Burley and Turkish crops were planted as experiments in co-operation with the B. The Burley experiment, on spacing and rates of nitrogen, grew well, and was reaped cured with little trouble. The Turkish experiment, which involved different dates of ting, ranging from October to February, had to be abandoned for experimental purposes, ng to a severe infection of bushy-top virus, coupled with insufficient soil moisture.

Forty-nine acres of maize were grown for grain, and five acres with velvet beans for e. The grain yields ranged from 15.0 to 30.3 bags per acre, with an average over the le farm of 22.2 bags/acre, quite a remarkable yield on so little rain. Five hundred bags of e, surplus to our requirements, were transferred to other stations.

The cotton and sorghum crops produced exceptonally good yields.

SUMMARY OF YIELDS AND ACREAGES OF CROPS GROWN IN 1963–64

ze:

nd —	I	Block 4	S.H.52	22·7 bags/acre	9·5 acres
	II	Block 1	D.H.13	22·3 bags/acre	4 acres
				20 tons silage/acre	5 acres
	IV	Cont. maize . . .	D.H.13	22 bags/acre	3 acres
		Maize/G. Manure Rotation . . .	D.H.13	30 bags/acre	1·5 acres
	IV	Block 3	S.H.53	15·7 bags/acre	4 acres
	V	. . . . .	D.H.13	25·5 bags/acre	9 acres
	VI	. . . . .	D.H.11	14·5 bags/acre (late planted) .	2·5 acres
				21·2 bags/acre (early planted) .	5·5 acres
	VII	. . . . .	S.H.52	24·2 bags/acre	10 acres

on: Albar 637, 2,057 lb./ac., gross return £67 14s. 2d.	from 1 acre
ghum: Hybrid 610, 24 bags/acre	from 1 acre
flowers: Russian Giant, 8 bags/acre	from 1 acre
a beans: Hernon, 4 bags/acre	from 1 acre
mer Wheat: Marodzi, 1 bag/acre	from 1 acre
undnuts: Makulu Red, 6 bags/acre	from 5 acres
d Beans: Canadian Wonder, 3 bags/acre	from 2½ acres
Natal S.B., 2 bags/acre	from 2½ acres
ley Tobacco: 1,460 lb./acre at 26·43d./lb.	from ¾ acre
kish Tobacco: Soluk, 990 lb./acre at 24·4d./lb.	from ½ acre
rinia Tobacco: 1,988 lb./acre at 22·14d./lb.	from 6 acres

During the year crop research on the college farm was limited to one groundnut and e maize experiments.

The district maize variety trial supplied by Salisbury Agricultural Experiment Station olved the testing of eight varieties. The highest-yielding variety was No. 11 with 28.46 a., while the lowest-yielding was Southern Cross with 20.4 b.p.a. The mean yield was bags per acre

In the row-spacing trial the mean yield for No 52 was 28.7 b.p.a., while that for No. 53 25.56 b.p.a.

The silage trial involved four levels of nitrogen (0, 33, 66 and 99 lb N per acre) and times of application. An application of 33 lb. N/ac. all at planting produced a signifi-t increase in yield of green material of 2.81 tons per acre. However, owing to the dry wing season, no further yield increases were obtained when applying 66 and 99 lb. N/ac.

A population x planting method x variety trial was performed in which the varieties encia and Mwitunde were each grown at populations of 50,000 and 100,000 plants per e and under two methods of planting ridge and flat. The mean yield for the variety encia was 12.74 bags shelled nuts per acre while that for the variety Mwitunde was b.p.a.

The Animal Husbandry Section

The average daily production per cow has risen from 19 lb./day to 28.3 lb./day/co the end of the year under review.

Due to the considerable increase in milk yield, there has been a corresponding ma increase in the amount of cream sold to the Dairy Marketing Board.

The Mashona beef herd has now reached its planned complement of 30 breeding and heifers.

It is hoped, that in the near future, a full inspection by the society will be made order to establish a registered herd.

A complete herd management programme has been drawn up, together with a sy of dam production records.

Twelve additional Mashona weaner heifers were transferred from Grasslands Rese Station in June, 1964, and this will allow strict culling to be practised in conformity with planned programme of establishing a registered herd.

There has been an increase in the size of the pig herd, from three to six breeding s by the acquisition of two Landrace gilts, a young Landrace boar and two Landrace x L White sows.

The new pigsties have been completed and automatic watering systems have been inst in the deep litter.

Sow and litter performance records are now being kept.

The sheep flock now numbers 180 head.

Permanent runs have been erected around the sheep house, together with a hand race to facilitate management, particularly dosing and inoculations.

A comprehensive management programme has been instituted for the flock and incl spring and autumn lambing.

Four hundred day-old chicks were received from Gwebi College in May and the pu have just started laying and the cockerels are being reared as table birds.

Permanent runs have been erected behind the brooder houses, and also for the turk which were obtained from Gwebi.

Egg production has increased markedly due to the increase in the number of bird

Bee-keeping has met with little success during the year, due to the hives being occu for only limited periods of time. A high proportion of "captured" swarms subseque absconded and therefore management has been difficult.

The Engineering Section

Building work carried out entirely by students included an implement shed, 60 ft. x 1 of gum poles, sawn timber trusses, and iron; a small concrete culvert; water supply to students' tennis court; and a concrete cattle grid.

Students also lent assistance in building the concrete spillway sill of the small ea dam, a store for fertilizer, a new piggery unit with feed store and three farrowing and fattening pens, and a new "topping" to the floors of the farm workshop and office.

Much useful workshop practice arose from the purchase of a second-hand comb harvester, for £180, with a further £20 needed for spares. After a protracted overhaul students, it successfully harvested small acreages of wheat, soya, sunnhemp and sorgh and, after hand-cutting and drying, sunflower and ration beans.

A hay-sweep made by students from £15 of materials (but starting with the great adv tage of a tractor-mounted front-end loader on which to fix it) was used to get nine acre excellent Rhodes grass hay quickly into temporary ricks, which were subsequently slo "turned" into 2,000 bales, using the stationary baler.

Educational

The year under review commenced with the enrolment of 12 students in Course 3, the return of courses 1 and 2 for their final and second years, respectively. The total co plement of the college is now 21 students, four having graduated in July.

In view of the fact that the decision had been taken to change the commencement of academic year and enrol Course 4 on the 1st April, 1964, it had been hoped that the ge would have a full complement of students by that date. Despite offering vacancies he 20 places available, only six students finally enrolled in Course 4. This disappointing nse can now be offset by the encouraging position for April, 1965. At the date of this ct, 76 firm applications have been received for the potential 19 vacancies in the hostel. therefore, now quite clear that there is a considerable improvement in genuine interest e college, and it is reasonable to expect this significant increase in applications to result rger enrolments in future courses.

Course 1 was completed in 1963–4, and the end of this first three-year course can be ded with considerable satisfaction. One student gained a first-class diploma, and the r three, pass diplomas. Of the remaining students in courses 2, 3 and 4 only one failed tisfy the examiners and gain entry to the next year.

ie first Diploma Day ceremony was held at the college on the 29th July, 1964, when r Excellencies, the Governor of Rhodesia, Sir Humphrey Gibbs, and Lady Gibbs, were guests of honour. Sir Humphrey gave an address, and Lady Gibbs very kindly presented diplomas and awards. The function was attended by about 160 guests, including a number frican chiefs and their assistants.

In September, 1964, a very successful short course on pig production, for African ners from the Native Purchase and Tribal Trust areas, was held at the college.

General

The Principal attended the fourth International Course on Vocational Education and ching in Agriculture, held at Zurich and Muttenz, Switzerland, from the 4th August to 1 September, 1964.

The college continues to receive many visitors and, in particular it is pleasing to record there is now a greater interest amongst the pupils of African secondary schools wishing visit Chibero, and see for themselves the facilities we have to offer.

College staff attended meetings, and made visits, as often as their eduactional duties and ponsibilities would permit.

GWEBI AGRICULTURAL COLLEGE

Introduction

The college year under review commenced on 3rd October and Diploma Day was held the 16th October, with Dr. and Mrs. A. E. Romyn as guests of honour.

On 1st December, 1963, Gwebi College reverted from Federal to Rhodesia Government ntrol, remaining under the administration of the Department of Research and Specialist vices.

Education

Twenty-seven students of Course 14 sat the final diploma examinations in July, 1964. enty-six of these men obtained the Gwebi Diploma, eight of these being first class. irty-six of the 39 students of Course 15 passed the examinations and became the largest ond-year course in the history of the college.

The Short Tour took the second-year students to Grasslands Research Station and to mers in the Marandellas–Rusape area. The Long Tour was along the route Banket–ioia–Chirundu–Kariba–Vuti and return to Gwebi via Alaska Mine. Agricultural enter-ises seen included the following special items: intensive pen feeding with various breeds, n Rooy sheep, game ranching, sugar and irrigation. Old Gwebi students were visited in e Tengwe Block.

Improvement of realistic practical work in the fields has taken place. During the year e issue of the long contemplated Field Section Handbook was commenced. It is hoped at over the course of time this handbook will come to serve as a useful practical guide students, not only during their stay at college but long after they have left.

Increased use was made of the laboratory this year for student instruction in bota zoology and soil science.

Production

Total rainfall was very much below average, 21.09 in. and 18.60 in. being recorded the two gauges. These figures compare with a 50-year mean of 32.61 in.

The following figures give the details of land utilization and field production on college farm, for the season.

Crop			
Maize grain (Broadbalk)	73·0	1,158 bags	15·9 bag
Maize grain (Gwebi South and Mundy South)	193·0	2,854 bags	14·7 bag
Maize silage (Broadbalk)	4·0	56 tons	14·0 ton
Maize silage (Gwebi South)	13·0	170 tons	12·5 ton
Maize legume silage (Broadbalk)	32·0	446 tons	13·9 ton
Wheat (Broadbalk)	12·0	68 bags	5·7 bag
Soya beans (Gwebi South)	35·0	115 bags	3·3 bag
Valencia groundnuts (Broadbalk)	2·3*	27 bags	11·8 bag
Makulu red groundnuts (Broadbalk)	9·3	82 bags	8·8 bag
Canadian wonder beans (Broadbalk)	13·0	24 bags	1·8 bag
Potatoes (Gwebi South)	3·9	130 bags	34·0 bag
Soya bean silage (Broadbalk)	15·3	31 tons	2·0 ton
Soya bean hay (Broadbalk)	31·0	31 tons	1·0 ton
Virginia tobacco (Red soil, 14·4d./lb.)	9·5	11,966 lb.	1,259·0 lb.
Burley tobacco (Red soil, 21·5d./lb.)	1·0	1,251 lb.	1,251·0 lb.
Turkish tobacco (Samsun, 34·2d./lb.)	0·25	214 lb.	856·0 lb.
Cotton (Broadbalk Garden)	0·27	458 lb.	1,696·0 lb.

*65 lb. unshelled.

At the beginning of the season it was decided to treat the Broadbalk rotation as simple "two-course": maize: legume: maize. This enabled a simplification of the farm m to be carried out and has considerably simplified the practical management of the far whilst having little effect on the acreages of individual crops.

After seven years of continuous maize on Lilford North Field it was decided to pla the top half of the land to sunflower in an attempt to reduce the infestation with systat beetle larvae. A small acreage of potatoes was also grown in this part of the field. T remaining half still under continuous maize was sprayed with DDT at the time of emergen of the adult beetles, as a control measure, and this 25 acres yielded 390 bags, which was w up to the yield of the average run of the college farm this season.

Turkish tobacco was grown for the first time, whilst sugar cane made promising grow in the college garden. The purpose of the latter is to test the local market for cane stic for African consumption.

The Friesland herd continued on the high level of production achieved in recent yea

The Hereford herd was maintained through the winter on 15 lb. maize silage and 2 l stockmeal mix per head per day. As calving time approached the animals were given 3 l stockmeal per head per day. Calving commenced on 28th August. The college's new Her ford bull, "Haven's Universal", imported from England, will be used in 1964–65 on som of the old sire's daughters. The average weaning weight for the 1963 calf crop was 427 lb

The autumn Blackhead Persian lamb crop was disappointing, possibly due to your rams being used. The flock was maintained in good condition through the winter on who maize and *ad lib.* access to soya bean screenings The policy of three lambings every tw years is still being followed and is entirely satisfactory.

Research

A close link is maintained with Henderson, Kutsaga and Grasslands research stations, isbury Experiment Station and the specialist laboratories; also with the activities of the partment of Conservation and Extension. Although circumstances have precluded much ivity in research at the college the philosophy that education, extension and research go sely together is followed.

A heavy infestation of snout beetle *(Systates exoptus)* considerably reduced the scope of experiments but eight critical experiments and 11 demonstrations were carried out.

STRICT MAIZE VARIETY TRIAL

Highest yields of 34.8 bags per acre were from 61DH8, followed by a new three-way oss, 613WH1, with 31.9 bags per acre. Single hybrid No. 52 was fifth with 30.6 bags per re and Southern Cross gave the lowest yields of 22.5 bags per acre.

ONTROL OF SYSTATES TRIALS

Three experiments to try to control the larvae of the snout beetle were carried out in njunction with the Entomology Branch. None of the chemicals tried out was very effective ainst the larvae; Telodrin was the best followed by Heptachlor and Diazinon.

LAGE CROPS SPACING TRIAL

This was carried out in conjunction with Matopos Research Station. Maize and three ifferent sorghums were compared at different plant populations and spacings.

All the yields were very high—between 20 and 30 tons of green matter per acre. Unfortnately, all the sorghums lodged very badly whilst the maize stood well. Highest yields were btained from maize, followed by Ribbon-cane, Sugar-drip and Haakdoorn respectively. igh plant populations gave better yields than conventional plant populations.

ORGHUM SEED RATE AND FERTILIZER TRIAL

The variety NK.300 was drilled at 14, 20 and 40 lb. seed per acre with 0, 200 and 400 lb. AN as a top dressing. Highest yields were obtained from the 20 lb. per acre seed rate and ields increased with an increase of CAN.

ROUNDNUT VARIETY AND APPLICATION OF GYPSUM TRIAL

Two groundnut varieties, Mt. Makulu Red and Virginia Bunch, were compared with nd without a top dressing of gypsum. Virginia Bunch significantly outyielded Mt. Makulu ed (5.9 bags of shelled nuts compared to 4.3 bags).

The application of gypsum at flowering time depressed yields, which is surprising in iew of the low pH (4.6 $CaCl_2$) of the soil.

UNFLOWER VARIETY AND SEED RATE TRIAL

Six different varieties of sunflower were compared at two different seed rates. Yields were very poor and there was considerable variation in the results.

Mars gave the highest yields whilst Short Russian gave the lowest. There were no ignificant differences between 6 and 9 lb. seed per acre.

EMONSTRATION PLOTS

Demonstration Plots were grown of the following:

(i) Eighteen varieties of soya beans;
(ii) Four varieties of wheat;
(iii) Two varieties of barley;
(iv) Four varieties of sorghum, rapoka and millet;
(v) Three potato varieties;
(vi) Four castor bean varieties;
(vii) Horse marmalade and Kuru vine;
(viii) Two varieties of cow peas;
(ix) Bambarra groundnut, Black Gran, Green Gran and *Crotalaria* spp.;
(x) Cassava;
(xi) White haricot bean.

STUDENT STEER TRIAL No. 5

This trial consisted of four different groups of six F1 cross-bred progeny based on Africander dams, viz:

Africander x Brahman
Africander x Aberdeen Angus
Africander x Boran
Africander x Santa Gertrudes.

The weights and gradings of the animals slaughtered in November, 1963, were as follows:

	R.B.	*Imp.*	*S.A.*	*Weight—day before slaughter*
Africander x Boran . . .	3	2	1	989.8 lb.
Africander x Aberdeen Angus .	3	2	1	1,028.1 lb.
Africander x Santa Gertrudes .	1	2	1	1,097.5 lb.

Five months previously the Brahman cross steers had averaged 1,140 lb. at slaughter.

The trial, as a student project, was very successful and supplied excellent material for judging and the assessment of the value of the animals. They were judged and valued on the hoof and then compared again on the hook. Financially it seems as though the better groups made a good profit whilst the poorer groups made a very small profit. It appeared as though the Brahman crosses were superior throughout, notwithstanding an initial weight advantage.

If intensive pen feeding is to be employed steers which are capable of making the maximum use of such intensive feeding must be purchased; i.e. the animals must be ready for market at an age of 30 to 33 months as was the case with the Brahman crosses. Furthermore, the weaners purchased for this purpose must be as heavy as possible, preferably in excess of 400 lb.

STUDENT STEER TRIAL No. 6

Again four different groups of animals were obtained from various sources:

Breed or type	*Source*	*Average weight on arrival*
Africander x Shorthorn	Capt. Hampshire (Umtali)	387.7 lb.
Africander x Sussex	Mr. J. Glanfield (Sby.)	421.3 lb.
Africander x Aberdeen Angus	Mr. D. Black (Sby.)	552.7 lb.
Tuli	Tuli Breeding Station	432.3 lb.

The college exhibited livestock at Gatooma, Salisbury and Umtali agricultural shows and did well against strong competition. At Umtali the Russell Memorial Trophy for the champion slaughter ox was won by the college for the sixth time. The student volunteers who accompanied the show string contributed much to the college successes.

The Principal continued to serve on the Standing Committee on Agricultural Mechanization and acted as judge at various ploughing matches. He also attended committees concerned with the introduction of a national certificate in agriculture for in-service promotion purposes and with the training of agricultural college staffs in teaching methodology, and he participated in the National Conference on Adult Education and External Studies. The Vice-Principal served on various livestock committees whilst the Senior Lecturer in Field Husbandry acted for the Principal on various committees during the absence of the latter overseas.

The Principal, Dr. W. L. Fielding, carried out two consultant's assignments in agricultural education. One was in Malaysia and the other, with a U.N.E.S.C.O. team in Bechuanaland, Basutoland, Swaziland.

Advisory Council

The council held one meeting in each college term and continued to take an active interest in college affairs. Mr. N. T. Waller, of Gwebi College Course 1 (1950–51), con-

inued to serve as chairman. Mr. Waller, who now farms in the Centenary Block, was Gwebi's first student chairman and first cricket captain.

ACKNOWLEDGEMENTS

This has been a trying and difficult year with many problems to overcome as a result of political upheavals. I therefore wish to express my sincere appreciation to all members of the staff for their loyalty and hard work under very frustrating and unsettled conditions.

I would also like to thank other departments in the Ministry and other ministries for their co-operation and assistance during the year.

J. C. RAATH,
Director, Research and Specialist Services.

Department of Conservation and Extension Report

for the year ended 30th September, 1964

INTRODUCTION

This report covers the agricultural season for 1963–64 and the administrative period from the 1st December, 1963, which was the day on which the "new" Department of Conservation and Extension officially came into being.

This act was by far the most significant single development in the history of agricultural extension services in this country, because for the first time, a single department was established to serve the interests of the whole farming community, both European and African, thus providing a sound base from which all the inherent advantages normally associated with a unified command could be exploited.

The review period has been a most interesting and challenging one, which has not only taxed the overall ability and structure of the new department to the utmost, but has also thrown up a very wide range of problems which have, in fact, penetrated very deeply in testing the fortitude and ability of every member of staff. However, despite all this, we believe that we have been able to meet the demands made upon us to the general satisfaction of the farming public.

The difficult task of welding a new organization into a cohesive whole still remains to be completed satisfactorily and while considerable progress has been made in this sector there are certain aspects falling outside the direct control of the Department which still require final decision. Here, particular reference is made to the many aspects of service conditions which have been the subject of inspection by the Public Services Board, and until finality is reached on most of these, the Department will continue to be handicapped and prevented from exploiting its full potential for service to the agricultural industry.

The immediate aim of this Department continues to be the implementation at field level of Government's agricultural production policy, a policy which was launched in September 1963, by the Honourable Lord Graham, Minister of Agriculture, when he threw out a major challenge to the country's agricultural industry. Particularly important developments affecting this Department in the course of implementing this policy have been our assistance to the Agricultural Production Commitee at all levels, considerable involvement at field level in the processing of agricultural loans for African farmers, and the above-average demands made upon us in connexion with drought relief work.

Reference to the body of this report will indicate more clearly, and in greater detail, the very wide range of activities upon which we are engaged and, finally, this Department is confident of its ability to improve its service to the farming community as well as intensifying its vital part in the development of a powerful agricultural economy.

GENERAL

Organization of Staff

The merger of the two former ministries of agriculture resulted in the movement of a large number of posts in order to create the new Department, and this has proved to be a most difficult administrative exercise, and one which has probably not been experienced by any other department in the service to quite the same extent. Fortunately, and in spite of the many problems, staff is gradually settling down, and subject to the strengthening of the administrative establishment, both in provinces and at headquarters, there is every reason to believe that the Department will very shortly be operating at high efficiency. The merger of the agricultural services necessitated a considerable number of staff changes, but in spite of resignations and transfers, new recruits have been slowly coming forward mainly as a result of the recruiting drives undertaken in the United Kingdom, Holland, and the Republic of South Africa.

The introduction of contract conditions of service has proved to be a powerful force in attracting recruits from overseas, and it is hoped that most of the vacant posts will be filled by early 1965.

To illustrate staff changes more clearly, the following schedule is submitted:

EUROPEAN STAFF

Appointments		*Losses*		*Total*	
Pro./Tech. Officers	*Admin.*	*Pro./Tech. Officers*	*Admin.*	*Appts.*	*Losses*
28	12	45	16	40	61

AFRICAN STAFF

Appointments	*Losses*	
168	132	(Resignations and discharges . . . 51)
		(Transfers — other departments . . 77)
		(Deaths . . . . . 4)

Bursaries and Study Leave

The Department has always supported endeavours to provide bursaries for agricultural students as well as the granting of study leave for serving officers. At present there are eight young men at university or at agricultural colleges who have been granted agricultural bursaries, and two officers on study leave. The latter will complete their studies at the end of this academic year.

Staff Quarters

With regard to the provision of quarters, European extension staff are satisfactorily housed, with shortcomings. The officers stationed in the smaller centres such as Fort Victoria have experienced considerable difficulty in finding accommodation, and additional quarters or "pool" houses will have to be provided to rectify the position.

Unfortunately the same position does not apply for African extension staff and there is a backlog of some 411 quarters required to house staff who have no accommodation or to replace those houses which are in a very bad state of repair. Following strong recommendation by this Department the Government Housing Committee allocated funds for approximately 308 African housing units for this financial year, and this will go a long way to relieve the position. However, with an anticipated new intake of 150 extension assistants in January, 1965, there is still a need for over 200 African quarters to be provided, and every endeavour should be made to obtain funds for this purpose.

Finally, this Department is very concerned about the lack of funds necessary for the maintenance of existing African staff quarters, and additional funds are urgently required for this purpose. Unfortunately, this aspect has been sadly neglected for many years.

Public Services Board Inspection

During the latter part of the year the Public Services Board commenced an inspection of all headquarters and provincial posts within this Department. The inspectors visited a number of provinces and obtained job analysis forms from approximately 140 officers. The report is expected to be completed some time in November of this year, and it is anticipated that a number of important changes might be proposed.

Visits to Other Countries

During the year some 13 overseas trips were arranged for officers of this Department, the purpose of which ranged from participation at international conferences to study tours for improving the technical efficiency of the officers concerned. Details are given in Appendix I of this report.

Representation on Committees

The Directorate served on more than 50 boards and committees during the year. These are listed in the form of Appendix II attached to this report.

Publications and Publicity

Officers of the Department wrote a number of articles for publication during the year, the more important of which are listed in Appendix III.

The *Rhodesia Agricultural Journal* has followed the same lines as in the Federal days, thus filling a place between the purely scientific journals and the popular farming press. The advertising side of the publication, so well developed in 1962–63, has continued to be a source of revenue.

The Public Relations Officer has been more than fully occupied during the year, having had 356 general press releases and 54 special articles selected for publication. He is also the editor of the *Rhodesia Agricultural Journal.*

The news letters issued by so many intensive conservation area committees are becoming an important factor in the life of the rural people.

The Department of Information's mobile units have also been of great assistance in disseminating agricultural information, especially in the remote areas.

SPECIALIST ADVISORY SERVICES

Planning Branch

Organization

The year has been one of reorganization and familiarization which has involved a considerable reorientation of thought on the part of all planning staff. The new Planning Branch is not directly comparable with either of the original planning branches, and as a result a certain amount of pioneering has had to be done, so far most successfully.

Farm Management Section

This is run by three officers seconded to the Department of Conservation and Extension from the Economics and Markets Branch of the Ministry of Agriculture. These three officers work within an overall plan prepared by the Senior Economist, but they also operate a second plan within the Department of Conservation and Extension. The country has been divided into nine areas by intensive conservation area groups, and each economist works within his own assigned area, carrying out various cost surveys. The three officers attached to the Conservation and Extension Department are responsible for training and providing advice on management problems to field staff and the farming community.

The most notable advance in farm management work this year has been in the establishment of management clubs, consisting of small groups of farmers who meet and discuss management problems and their methods of solution. To assist them in their discussions they keep accurate records of labour, tractor and financial utilization on record sheets which have been prepared in conjunction with the Farm Management Section.

To assist this development, a central tabulation and analysis service has been established which prepares schedules and analyses of the results. As a result the section has prepared standards of labour, tractor and financial usage for all operations in growing tobacco and maize which can be used by the groups to assess their performance. These standards can also enable other farmers and extension workers to use them for comparison work in a wider field. Investigation is actively under way to extend this work into the African farming areas.

Much of the section's work has involved lecturing at courses for in-service training of extension officers, at farmers' courses, at field days and to discussion groups. Numerous individual visits were also made and as a result the service is becoming widely known. It is a relatively new section in the Department of Conservation and Extension, but there is no doubt that, in line with experience elsewhere in the world, the Farm Management Section has a vitally important part to play and will become one of the most important extension aspects in all areas of the country.

Work Study Section

This section has continued to render sterling service to the tobacco farming community, and has also extended its activities to include Burley, maize and cotton; further extension

into fruit is visualized in the future. To improve the flexibility of the unit, the areas serviced by each officer have been modified slightly, which has improved the national coverage and at the same time has permitted the establishment of a work study team, under the Senior Work Study Officer, which is able to work effectively and with concentration on a major project if required. During the year new methods of investigation were introduced to improve techniques and to make results more accurate.

Studies were carried out during the year to investigate the many new methods of handling tobacco that have been introduced since the R.T.A. Work Study Manual was originally published. Arrangements have now been made for this manual to be completely revised, as it is essential that it should be if it is to keep its rightful place as an effective and powerful extension tool. In the extension field, there was a reduction in the number of individual visits carried out by the section because of staff shortage during the busy time of the year. Training of field staff has been stepped up and there is no doubt that as a result field staff are becoming far better equipped to deal with the day-to-day problems in work study with which they come into contact.

The work study staff have been involved as lecturers in a wide variety of courses, and to assist them in this aspect of their work they are preparing, in conjunction with the Tobacco Branch, a training film on flue-cured tobacco. Short films for training purposes have also been prepared on Burley, maize and cotton but these are not as comprehensive as the one being prepared on flue-cured tobacco.

The section has also prepared a large number of articles for publication.

As mentioned before in this report, the work of this section has been closely integrated with that of the Farm Management Section to the mutual advantage of both.

Central Planning Section

Following the dissolution of the Federation, the two planning teams operated by the Federal and Southern Rhodesia ministries of agriculture were amalgamated into one team. This team has been based in Salisbury, renamed the Central Planning Team, and is available for work anywhere in the country. This has filled a need which has been expressed for many years by many people, and there is no doubt that it is proving highly successful and efficient in its new role.

During the year the Sabi catchment exercise was concluded, and an analysis shows that the team planned 262 farms with a total acreage of 741,691 acres, local extension staff planned 94 farms involving 338.298 acres. Following this the team carried out soil classification on 220 farms in the Ziyambe Purchase Area, and an outline extension plan was produced for the area. It is intended that this work should be completed next year. The team also carried out two soil investigations in the Hippo Valley Settlement Area involving some 39 new farms. Viability checks were done on Purchase Area farms in Wiltshire, Lancashire and Copper Queen; this has revealed a scaling and mapping problem which is now being investigated by the planning branch.

Initial investigations into the arable and grazing potential of Buhwa, Sipolilo, Kana, Lutopo and the central plateau area of Gokwe were also carried out. An erosion survey report of the Chiredai catchment was prepared, and an initial development plan of a large estate in Tsungwesi Intensive Conservation Area was also finalized. Two farm planning tasks in the Karoi group were done to assist local staff in reducing a large backlog of farm plans in an actively developing area.

Furthermore, the planning section prepared material and supplied lectures for external courses.

Topographic Section

This section is the only one which has suffered continuous vacancies. It is a very specialized type of work and requires men with a specialized training of survey draughting. These men are scarce in the world and competition for their services is strong. Used wisely the topographers can ease the work of field officers to a tremendous degree, and this is of great value in this country, where extension staff are under constant heavy pressure.

During the year four major photo-interpretation assignments were carried out, including areas in the Matopos, Victoria, Mashonaland and the Chiredzi catchment. Initial development plans for new farms in Sipolilo A were also prepared.

A new photo-interpretation procedure has been devised by the Senior Agricultural Topographer which lays more emphasis on the land forms which are significant and less on photo "patterns" which are found not to be so consistently significant.

The section was heavily committed to lecturing in the various courses held during the year and in addition carried out initial training work with 24 new recruits to the service.

Farm Planning Statistics

This year a further 137 farm plans were completed, bringing the national total to 2,484 and covering 12½ million acres. In the African areas the preparation of area reports continued and planning of individual farms in the Purchase Area has proceeded. Much of the successful application of planning procedures in African areas depends on the delineation of communities within an area and the location of the natural leaders of those communities. If this is done, planning can then be carried out by negotiation and discussion.

Engineering Branch

It has become increasingly evident that direct advisory services to the farming community in engineering matters must be confined within certain narrow fields where the effect will be fairly widespread and to training of the extension staff and, where possible, groups of farmers or farm employees in order to achieve the great effect possible with the very limited engineering staff available. This does not lessen the need for more staff to achieve the very substantial savings and increased income which are possible with intensive effort.

Farm Machinery Section

As a result of amalgamation, the strength of this section of the branch has increased, the two former sections now being together under the Senior Farm Machinery Engineer.

With the assistance of the Standing Committee on Agricultural Mechanization, who have done much valuable work, substantial progress was made, particularly in training. Next year further progress will be made as it will now be possible to prepare a full programme.

Training

During the year the greatest emphasis has been on establishing the Farm Machinery Training Centre at Domboshawa and this has been done with a considerable degree of success. Most of the building alterations for the centre are complete, the standing committee supplied the tractors required, and some of the teaching and demonstration aids were donated by the trade, made by the staff or purchased.

As a result, 13 courses were held during the year, seven of which were sponsored by the Standing Committee on Agricultural Mechanization for farmers and farm employees. Comments and evaluations of the courses show that they have been very well received and are basically meeting the needs. It is intended during the coming year to provide 19 courses, the majority of which would be for the Department's field staff.

A tillage demonstration, which will become part of the tillage research to be started soon, will be set up at Domboshawa where the effects of different tillage practices can be shown and explained to trainees.

The training given has created an awareness in both staff and farmers of the need for it and the demand for similar and more advanced training is growing.

Extension

The amount of time spent on establishing the Farm Machinery Training Centre and on running the courses has left little to give to extension, and what has been given has mostly been confined to a few field days and ploughing matches. Although training is probably the most valuable form of extension it should not be undertaken to the exclusion of other extension activities, particularly the production of bulletins.

It has been very clear from observations that extension is very badly needed, particularly n African areas where farmers' knowledge of the care, maintenance and use of machinery s far from adequate and the specialized knowledge for guidance is almost non-existent. f any impact is to be made on this aspect of the work investigations must be instituted into he suitability of the machinery used in, and available for, these areas, so that advice may e well informed and effective.

Central African Ploughing Association

The work of the association has been very effective in improving standards of ploughing in the country where matches have been held and a gradual increase in such contests is taking place. The association, which is affiliated to the world body, was represented this year at the World Ploughing Match by both the national champion and the runner-up.

A new departure locally has been competitions in ploughing with oxen, and three matches were held for this purpose. The results have been very encouraging but they indicate the need for a better appreciation of the finer points of this nearly lost skill.

Development

The only development attempted during the year was on a steerage hoe in conjunction with a local farmer. Although he was very co-operative, the amount of time available to him and to the staff for trials and modifications at the appropriate times was insufficient to achieve any concrete results. During the coming year, however, development is to be started at the engineering centre at Henderson Research Station.

FARM BUILDING SECTION

Only one of the two specialist posts has been filled and to date there has been no suitable applicant for the second.

Flue-cured Tobacco Buildings

The use of the multi-purpose, long, low barn continues to grow steadily with improvements being made as more experience is gained.

In the meantime, studies are continuing on conventional barns, particularly in relation to the causes and prevention of fires, which are now being studied by the Standards Association of Rhodesia and Nyasaland.

Burley Tobacco Buildings

With the rapidly growing interest in Burley tobacco, investigations into the suitability of existing designs of barns continued. A new bulletin was prepared and issued. In addition, and in co-operation with the trade, commercially manufactured prefabricated steel barns were tried and proved successful on large-scale enterprises. Studies on the design and construction of prefabricated timber barns was continued and the information passed on to the manufacturers concerned.

Grain Handling

Much study was carried out in the design, construction and operation of maize-handling structures which were built at the Agricultural Engineering Development Centre at Henderson Research Station, where they formed one of the central features of the two-day demonstration on maize harvesting and handling, which was such an unqualified success. The structures and equipment on display included cribs, silos, cob and grain elevators, maize-bagging equipment and bulk conveyors and transporters.

Training

With the shortage of staff, more emphasis is being given to in-service training of field staff, particularly tobacco-trained officers. Lectures were also given at a farmer training course in Burley tobacco.

The main emphasis during the latter half of the year has been on the production of a book on *Farm Buildings in Rhodesia*, of which a skeleton of the first section has been prepared. It is intended that this should be a handbook for field staff and farmers rather than a student's textbook.

Extension

Little time has been left for general extension and as a result the emphasis has bee on extension aspects which, at the same time, would serve as a subject study for new c improved designs or methods, particularly where they would be of benefit to the conter of the book on farm buildings.

Investigations of coffee factory design were carried out with the Coffee Adviser and design produced for construction by the Rhodesian Wattle Company at the Vumba.

General

The shortage of staff has been responsible for the emphasis on the types of wor mentioned above, but what should be a valuable part of the section's activities is bein virtually ignored, *viz.* field days and demonstrations as well as more individual advice.

There is great scope for bringing local industry into the picture more fully. As lon as the farming industry has to rely on imported equipment, which is produced for over seas conditions so very different from our own, they will hesitate to buy and either do with out or make up some inefficient but inexpensive imitation or original. Local manufacturer could, with help and guidance, do much to fill this gap with products designed to suit loca farming needs at reasonable prices.

ENGINEERING RESEARCH

With the break-up of Federation, all active research in the engineering field of agricul ture has ceased but the staff stayed on for a while to wind up the past summer's work and to complete their reports and bulletins of the work to date. These have been typed and are awaiting printing by the Government Printer.

In line with the drive for greater production, the emphasis will be changed from erosion research to tillage research and machinery and building development. Enough information on controlling soil and water loss is available for the present and a much greater contri bution can be made to the country's economy, and much more quickly, by this change.

Erosion Control

No expansion or alteration of the programme took place and effort was concentrated on consolidation and confirmation of previous years' work. The gully control experiments in the Bembezaan Intensive Conservation Area will continue in order to confirm the work to date and for demonstration purposes.

Catchment Research

No additional recorders were installed and the recording of flow is being done by the Hydrological Branch of the Ministry of Water Development in co-operation with the Hydro logical Co-ordinating Committee. Several seasons' more results are needed before they can be analysed.

The Sabi Catchment Investigation Team, under the leadership of the Senior Research Engineer, has completed and issued its report on land use and silt movement in the Sabi basin. It pinpoints the major causes of erosion.

S.A.R.C.C.U.S. Committee on Erosion Research

The Senior Research Engineer, who was appointed a one-man standing committee of S.A.R.C.C.U.S. "to lay down standard techniques for the measurement of run-off and erosion" has drawn up his proposals and a report submitted at the meeting of S.A.R.C.C.U.S. in June, 1964.

Drainage Research

No further development was carried out but the work which has been done was consolidated and sites that were not giving any results of value were abandoned and the recorders removed. The purpose was to reduce the extensive nature of the experiments and concentrate on more intensive work. Main concentrations of study are now being developed at Grasslands on granite sand and at Thorn Park on a heavy clay.

Because of the loss of the Research Egineer, no expansion or development of any sort taking place but recording on the sites that are being retained is continuing with observers stationed at appropriate points.

An agronomist has been appointed whose principal function is to study various crops, eir suitability on drained vlei areas, and the factors affecting their success or failure. He is orking closely with the farmers and the officers at Grasslands Research Station.

oil, Veld and Water Conservation

Advice, guidance and instruction were given to field officers, farmers and others on dam ing, design, construction, maintenance and other problems, on erosion control and reclamaon work, on road siting and drainage, and on tapping of vleis for a clean water supply for ttle.

A bulletin has been written and is about to be distributed on methods of collecting d storing water which at present runs to waste from roofs, rock domes and vleis, for man and stock use.

The working account units have, in addition to their normal activities of building edium-size dams and bush clearing, carried out erosion control measures and built a mber of small dams in the Purchase Area. The termination of subsidies for water conrvation works will, for a while at least, adversely affect the construction of dams but this ay be offset by the loans now available to Purchase Area farmers.

The Ministry of Water Development and the Ministry of Roads and Road Traffic have ven their ready assistance and co-operation to both head office and field staff in common elds of work and this is much appreciated.

oil Conservation

Arable Areas.—The requests for pegging of protective measures have in general been et but in some areas farmers have not always followed it up by construction.

In the European farming areas the protection of arable lands is almost universal but andards of construction and maintenance often fall short of requirements and a wet season ill catch many farmers napping in this respect.

In some parts of the Purchase Area there is a considerable backlog in both pegging d construction of protection works and a special effort will be made to overcome this. andards of construction and maintenance must also be improved if erosion troubles are to e avoided.

The position in tribal areas is serious and the situation is bedevilled by politics and timidation, both real and anticipated. The slackening, or lack, of standards in the allotion of land by chiefs has made the position worse and land which should never be cultited, or cultivated only if fully protected, has been brought into production. A very ccessful seminar, to determine methods of dealing with land allocation and protection, as organized and held by the Ministry of Internal Affairs, the Natural Resources Board, e Land Inspectorate and this Department at the Alvord Institute near Fort Victoria and as attended by a number of chiefs, sub-chiefs, headmen, kraalheads and chiefs' messengers om the Zaka and Bikita districts. It was so successful that similar seminars will be held all provinces to deal with these problems. The use of more fertilizer and larger plant opulations to obtain greater returns is growing in African areas and this, through denser over, is improving soil protection considerably.

Streambank cultivation is reasonably well under control but in some tribal areas the ltivation of vleis is widespread. Where streambank regulations are observed and the land adequately protected, vlei cultivation is acceptable and often necessary to provide an lequate diet. (See Appendix VII.)

Roads and Railways.—The co-operation and liaison between the Ministry of Roads and oad Traffic, road councils, Rhodesia Railways and this Department remains good. These odies now have an understanding of one another's purposes and problems and this has sisted in arriving at satisfactory solutions of the problems encountered in road alignment d drainage and in prevention of erosion where it has, or might have, occurred.

While road development and construction has proceeded apace in some areas, in othe the position has deteriorated. Main and district roads are improving but many local roa particularly in tribal areas, are deteriorating.

Veld Management

In the farming areas standards of management continue to improve but progress slow. The principle of light summer grazing is gradually being adopted with very cc siderable success and it is hoped that it will now increase more rapidly.

In the lower rainfall areas particularly, local overgrazing remains a problem and t past low-rainfall season has aggravated this. The need is for more watering points to ma better use of grazing and reduce local over-stocking.

The Tribal Trust Land continues to be overstocked and grazing management is pra tised in very few parts of it, resulting in a deterioration of the veld and serious bu encroachment. In one low-rainfall area Tribal Trust Land management is successfully carri out on a 40,000-acre "ranch unit". (See Appendix X, Table 6.)

Little pasture development has been undertaken but it is expected that the increas interest in beef production will stimulate it.

Veld Fires.—The extent of veld fires has been variable this year. In general where sto are an important part of the farming enterprise there has been a reduction but in areas whe this is not so there has been an increase. In the drought areas and in the tribal areas t incidence of fires was low due to the sparseness of vegetation. There has been a great awareness of the need for, and an increase in preventive measures to attain greater fi control but, due to the early cessation of rains last season and the longer dry season a heavy frosts, some areas have suffered more severely.

Bush Encroachment.—This remains a serious problem throughout the country and related to past and present overstocking and timber cutting. Considerable interest is show in the problem but, other than some desultory attempts to control it by ring-barking a fire, little is done.

Control by fire is often unsuccessful, as in many cases there is insufficient grass to g a hot burn and in some instances no grass at all.

In very few areas is the position being contained or recovered. Bush encroachment advancing generally and in the Tribal Trust Land and many parts of the Purchase Ar the position in the grazing areas is very serious.

Fencing.—Progress continues to be made in most farming areas but not always to be advantage. More thought should be given to its planning and use.

In Tribal Trust Land there has been a regression and fences have, in some areas, falle into disrepair or been stolen.

Water Conservation

Dam Construction.—Firstly, the restriction of subsidies and latterly their complete with drawal has affected dam building considerably, and smaller farm incomes due to the drough have also contributed to the decrease. However, with the subsidies available in the earli part of the year and the loans which have recently become available much more free to Purchase Area farmers, a number of small dams have been built in these areas. As result, although the number of dams compares reasonably with last year, the total capaci has been halved. The figures for this year are 316 dams with an aggregate capacity 1,418 million gallons. (See Appendix VIII.)

There remains a great need for more water storage in all areas and indications no are that considerably increased numbers will be built in the Purchase Area.

Better maintenance is needed if dams are not to be lost and costly repairs are to b avoided. Catchment protection is also needed if the life of dams is not to be very short du to siltation.

Liaison between the Ministry of Water Development and this Department is of a hig order and thanks are extended to the Ministry's staff for the ready help given.

Other Water Supplies.—The development of piped water schemes has continued in the wveld where there is now some 113 miles of piping. Proposals for various major communal hemes are also under consideration for that part of the country.

Boreholes are being sunk in all areas with variable degrees of success and in many areas her methods of providing water must be pursued. A technical memorandum on methods, her than the conventional, of obtaining water supplies is about to be issued.

ECHANICAL UNITS

With the withdrawal of subsidies for dam construction, and the reduced income of the rming community due to the drought last summer, the Working Account had a difficult ar, working only 13,806 hours, compared with 15,820 the previous year, and producing profit of only some £400. There has recently, however, been a surge of work requiring e fleet to be increased from 10 to 13 units temporarily.

The majority of the work undertaken was dam building and stumping in European rming areas, stumping in new divisions of the Purchase Area, and some dam building id erosion control measures in a few older divisions of the Purchase Area. Latterly, there is been a spate of work on bush clearing for the Department of Veterinary Services for me control in tsetse areas, and for the Ministry of Internal Affairs for bush clearing id road formation in the development of new areas.

The value of operating these units cannot be overestimated. Without this organization will just not be possible to perform these minor functions so important to the country. he field staff operating under difficult conditions and for long hours deserve credit for the anner in which they have carried out this important work.

Agronomy Branch

AJOR CROPS

laize

The abrupt cessation of the rains in February severely prejudiced crops that were planted ter about the middle of November and affected adversely even those which had been anted before that time. Many farmers converted their late planted maize into silage when became apparent that the potential level of grain yield was extremely low. The effect the drought on maize in the Tribal Trust Land was, in the main, more severe than in ie farming areas and planting there took place very much later than usual. By the end January, for example, only 70 per cent. of the lands owned by African cultivators in the ribal Trust Land had, in general, been planted.

Stalkborer attack was widespread and severe throughout the country and, where not mbatted by DDT applications, depressed yields markedly.

Certain areas suffered more severely than others due to a particularly poor rainfall istribution. Mount Darwin, which averaged five bags per acre, Bindura and Glendale, hich harvested between five and eight bags per acre on the average, and Shamva, where ss than five bags per acre were reaped, were particularly badly hit as were Tribal Trust and growers in the extreme north and south of Manicaland, Charter, Tjolotjo, Matobo, eitbridge, Chibi and Shabani.

Despite the exceedingly difficult season yields of grain in many parts of Mashonaland irned out to be far better than was originally anticipated in April.

orghum

As was to be expected, this crop withstood the drought very much better than did iaize and good yields were achieved in the Tribal Trust Land areas of Chiwesha, Belingwe, mtali South and Tjolotjo. Framida gave 18 bags to the acre in Nkai and Feterita 11/56 ith adequate manure and fertilizer dressings yielded 16.25 bags to the acre on a test emonstration plot at Tjolotjo. Crop failures were reported from Gwanda, Beitbridge, latobo and Kezi.

European and Purchase Area farmers who grew this crop in the Midlands, Victor and Matabeleland provinces had variable results depending upon rainfall distribution but the main, yields were satisfactory.

This is a crop with a great future in the marginal maize areas and the demand for see of high-producing types such as the hybrid NK300 undoubtedly will increase once th Quelea problem is overcome.

Cotton

Due to the belated arrival of good rains only 12,000 acres were planted of the 18,00 it was originally anticipated would be established to cotton. It became apparent in Ma that the crop was going to be considerably heavier than was at first thought. The reason fo this favourable outcome can be ascribed to the very low insect-pest incidence which allowe the upper third of the bolls to develop and open, and to the fact that most of these to bolls were fully open before the first frosts occurred.

African-grown cotton produced under irrigation in the Sabi Valley on about 600 acr gave an average yield of 2,321 lb. and an average gross return of £76 per acre.

The Cotton Advisory Officer was able to call on 470 individual cotton producers durin the year and spoke at many cotton meetings prior to the 1963–64 season and again durin September, 1964, on various aspects of production. Eight of these meetings were for Africa growers. He also organized two courses on cotton for African extension instructors, on for African farmers and one of two days' duration at Gatooma for European extension staf

During the period April to August, he classified nearly 40,000 bales—the entire cotto crop.

Interest in cotton has mounted steadily and the excellent results achieved this past yea have been primarily responsible for the extremely large purchases of seed by farmers fo planting in 1964–65.

Groundnuts

The poor rains and their untimely disappearance in January/February adversely affecte groundnut crops in the greater part of the country, particularly in Matabeleland where lo populations helped to depress yields. In the worst-affected areas kernels failed to fill ou and yields were low in consequence.

As a result of the decision taken during the year by the Groundnut Committee of th Grain Marketing Board to standardize, where possible, the colour of nuts produced in thi country, all the Department's field staff in African areas were given sample packets of th flesh-coloured groundnut of the Natal Common/Valencia type to help indicate to producer exactly what type of product is required. African farmers, who grow about 97 per cen of the country's groundnut crop, will be encouraged to plant only this type of seed from no onwards. The results of this policy should become apparent in about three years fro now.

Edible Beans, Soyas and Other Legumes

Edible bean crops were grown in most African farming areas and yielded reasonabl well only in those rather rare instances this past season where rainfall distribution wa favourable. The acreage of European production was comparatively small.

Soya beans were adversely affected by a shortage of rain and did not yield more tha about three bags per acre except where conditions were particularly favourable.

Velvet beans and cowpeas for dryland fodder production were produced in adequat quantities but the overall yield level in tons of green matter per acre were not as high a usual.

Barley, Munga and Rapoko

Excellent crops of barley, yielding on the average between 20 and 24 bags per acre were grown under irrigation on European farms in the Cashel and Umshandige intensiv conservation areas on contract for the breweries.

Munga and rapoko each occupied a substantial acreage of the cropping area in Tribal rust Land as well as in the Purchase Area, especially in the higher rainfall parts of the ountry. Yields varied from two to three bags per acre.

rops for Seed

The pattern of production followed that of previous years in that the main seed-roducing area remained the Sabi Valley, where crops continued to be grown under irri-ation and Africans rather than Europeans dominated the scene in so far as beans, lettuce nd tomatoes were concerned. In the Sabi Valley, for example, 1,081 acres of beans, 81 cres of lettuce and 16 acres of tomatoes were grown for seed by African irrigators on ontract for various seed houses.

European growers grew 646 acres of beans for seed merchants, but also concentrated n flower, cotton, groundnuts, sorghum, wheat, potatoes and tobacco seed production.

The total acreage that was established to certified or approved seed crops for seed roduction purposes during the year was 6,383. This does not include maize, which amounted o a further 5,990 acres, made up of 840, 1,250 and 3,900 acres of hybrids 11, 13 and 52 espectively.

Wheat

Excellent crops of winter wheat, with a potential yield range of 14 to 20 bags per acre were grown under irrigation in the European farming areas of Sherwood (near Que Que), he Mazoe Valley, Cashel Intensive Conservation Area and in Umtali North Intensive Conservation Area. Very good wheat indeed (± 20 bags/acre) was produced by Africans in he Shashi irrigation scheme in the Matabeleland lowveld but that on the other irrigation chemes such as Chibuwe, Umvumvumvu, Nyanyadzi and Mutema was disappointing, the verage being about five bags per acre.

Mazoe is still the most widely grown variety.

Summer wheat production is concentrated mainly in the Inyanga Intensive Conservation Area and in the Que Que area of the Midlands, where yields vary between eight and 12 bags per acre under dryland conditions. Weeds are a major problem in the case of summer wheat production—they can be brought under control through the judicious use of a herbi-cide such as 2.4-DB applied at the correct stage as a post-emergence spray. It would naturally be far more satisfactory to use a pre-emergence spray but, unfortunately, a suitable prepara-tion for this purpose does not seem to exist.

Sugar Cane

By the end of September, 1964, the total acreage under sugar cane in Rhodesia was 49,501, the major producers being Triangle Limited and Hippo Valley Estates Limited in the Victoria lowveld and Chirundu Sugar Estates Limited on the south bank of the Zambezi. The breakdown of the total acreage established to sugar is as follows:

Victoria lowveld	43,288 acres
Chirundu	5,613 acres
Chipinga	600 acres
	49,501 acres

The average yield of cane achieved in the Victoria lowveld was 60 tons per acre which, by world standards, is extremely high. Rhodesia Wattle Estates Limited at Chipinga produce their cane on a 24-month cycle and harvest three ratoon crops in addition to the plant cane crop; this is produced under rainfall conditions without irrigation, the average yields being 30 to 35 tons of cane per acre. It is the intention of this company to increase its acreage to 800 within the next two years.

Expansion of the acreage down to this crop in the Chiredzi Intensive Conservation Area is proceeding rapidly. NCO376 and CP29116 are the two varieties that are most

widely grown on Triangle, which is the largest sugar producer in Rhodesia. NCO310 is th most popular variety on Hippo and NCO331, which is grown on the Rhodesia Wattle Com pany Estate at Chipinga, is steadily being replaced by NCO376.

Tea

The value of tea produced by the five company estates along the eastern border ros to £600,000 this year and further expansion is planned.

Of particular interest is the progress being made by the four African tea growers Holdenby who plucked their first leaves in January. The Eastern Highlands Tea Estat accepted the green leaf and the growers were very pleased with the results they achieved A yield of 1,666 lb. of green leaf was plucked from 1¾ acres in one case, the highes recorded plot yield being 804 lb. from half an acre. These four growers are expandin their tea acreage and, with five new African growers who will probably enter the field, ther should be 7¼ acres down to this crop in Holendby next season.

Coffee

A steady expansion of the acreage down to this crop continues to take place in th European farming areas around the Vumba and Chipinga where both existing and new growers are preparing to establish another 600 and 200 acres respectively.

Despite the unusually cold winter and, for those areas, severe drought, coffee in the Eastern Highlands survived without much damage and, in fact, has shown that it can carry heavier crops than was at one time thought possible. Yields of a ton per acre at Chipinga Experiment Station, which is twice the weight expected, have not caused the bushes to be set back.

There are 13 African growers in the Tribal Trust Land areas of Holdenby and Manga whose acreage, it is anticipated will slowly expand in the due passage of time. The only other African-grown coffee in the country is in the Ngorima Tribal Trust Land south-east of Melsetter, where 20 acres have been established. Small quantities of coffee sold in Maran dellas from this area fetched £310 per ton.

The Coffee Growers' Co-operative has erected a coffee mill in Umtali which is scheduled to start operations soon. It will process the 60-ton crop grown by its members.

Potatoes

Very good certified seed crops were lifted at Inyanga at the end of February, yields varying between 150 and 200 bags per acre.

The short rainy season greatly benefited commercial potato crops in all parts of the country in so far as disease incidence was concerned, the summer crop, for example, being virtually free of late blight.

Poor rains, however, definitely limited the acreage of the irrigated crops that were established due to their failure to replenish adequately streams, rivers and dams. July plantings in the Umwindzi Valley were considerably smaller in acreage because of this reason. Despite this fact and the unusually severe frosts that occurred in May and June, winter yields were good on a bag-per-acre basis.

Up-to-date continues to be the most popular variety because of its white flesh and resistance to late blight. Pimpernel is steadily increasing in importance because of its resistance to this disease and its high starch content (24 pe rcent.) which makes it particularly suitable for chip manufacture. There is a prejudice among housewives against its use as a table potato because of its red skin and yellow flesh.

Citrus

Large organizations such as Mazoe Citrus Estate, Sinoia Citrus Estate and Hippo Valley Estates Limited continued to dominate this field and little development of smaller citrus projects took place during the year. Hippo Valley Estates Limited is now the largest pro-

lucer and exporter of actual citrus fruit in the country. Details concerning the scale of operations are given below:

	Grapefruit (*Marsh Seedless*)	*Oranges* (*Valencia*)	*Lemons* (*Eureka*)
Total trees	40,000	48,000	9,000
Bearing trees	12,424	23,551	3,950
Cases of fruit exported	18,457	27,660	9,380 (half-cases)
Case equivalent production	43,047	46,759	14,018 (half-cases)
Percentage exported	43	59	66.5

Mazoe Citrus Estate is by far the biggest company of its kind in Rhodesia and is continuing to expand. Its major emphasis is on the production of juice concentrate with essential oil as a by-product.

Deciduous Fruit and Vegetables

Good crops of apples, peaches and plums were reaped in the Eastern Districts and indications are that the coming season's harvest will be even larger.

The peach crop at present on the trees is on the average seven to 10 days later than usual, due, probably, to the continuously cold nights experienced during the early stages of fruit development. There is a great interest in the expansion of acreages established to dessert peaches which have a compartively low chilling requirement. Growers in suitable areas are being encouraged to establish plantings of yellow-fleshed clingstone peaches for canning.

Elsewhere in Rhodesia there is increasing interest in deciduous fruit as a line of production and the action of Umvukwes farmers in forming a deciduous fruit growers' association is indicative of this fact. Rusape is another area where farmers have become particularly conscious of the potential that exists for deciduous fruit production; vegetable growing for the processing factory in Umtali has also featured largely in their plans for the future.

Aside from European market gardeners in the vicinity of Bulawayo and Salisbury and domestic garden producers who grow their own requirements, a considerable amount of vegetable production takes place on vlei margins near the bigger towns by Africans who hawk their garden crops from door to door in the suburbs. Most of these producers were badly hit by severe frosts in May and June.

General

The Chief Agronomy Extension Officer, in his capacity as chairman of the Maize Harvesting Demonstration Committee, helped to organize the demonstration of maize-harvesting techniques which took place on Henderson Research Station on the 8th and 9th July. Over 500 farmers attended these two field days and adjudged them a great success. In addition to Conex, the R.N.F.U., Rhodesia Agricultural Dealers' Association and Farm Mechanization Standing Committee are represented on this organizing committee.

Field Trials and Test Demonstration Plots

Field Trials in European Farming Areas

During the 1963–64 season the following critical cropping trials (excluding tobacco) were carried out on European-owned farms in Rhodesia by the staff of this Department in co-operation with the Department of Research and Specialist Services:

Maize variety	9
Sorghum variety/seed rate	7
Sorghum *versus* maize for forage	1
Soya bean	8
Summer wheat variety	4
Winter wheat variety	1
Edible bean variety	2
Sunflower variety	3
Maize streak control	2

Horticultural crops	1
Maize liming trials	11
(In co-operation with the Agricultural Research Council)	
Groundnut fertilizer	7
Cotton fertilizer/time of planting	1
Cotton spacing	4
Cotton fertilizer	2
Cotton variety	4
	67

The results of these have been analysed by the specialists concerned and are now being collated.

There were also 56 non-critical trials and demonstrations established on European-owned farms during the season under review. (Appendix IX, Appendix X, Tables 2 and 3.)

In January and February the results of all the critical farm trials done by the former Federal Department of Conservation and Extension in Southern and Northern Rhodesia during 1962–63 were collated by Mr. Heyting of this Department; they were published in March, 1964.

Test Demonstration Plots

During the 1963–64 season there were 543 test demonstration plots in tribal areas and 200 in the African Purchase Area. Of the former, 206 (38 per cent.) were established to maize which also formed the most important single crop in the Purchase Area plots. Other crops incorporated in these test demonstration plots were those in which Africans were most interested, such as sorghums, millets, edible beans and cow peas. Yield results are still being received and will be collated in due course. (See Appendix X, Tables 2 and 3.)

PEST AND WEED INSPECTORATE

Staff

On the 1st December, 1963, an establishment of six pest and weed inspector posts was created in this Department, all these positions being filled by members of the former Federal inspectorate service.

Inspections

During the year 4,097 inspections were made in terms of the Plant Pests and Diseases and Noxious Weeds Acts, and of this figure 3,349 were concerned with visits to tobacco farms and tobacco premises for the purpose of implementing regulations promulgated under the former legislation.

In addition, the tobacco tranship sheds at Beira were inspected eight times by the Senior Pest and Weed Inspector or his deputy on behalf of the Tobacco Trade Association.

Prosecutions

Twenty-two prosecutions were made against farmers who had failed to comply with the requirements of the Plant Pests and Diseases (Tobacco) Regulations and fines were imposed in 17 of these cases. Due to legal technicalities or because the defendants could not be traced, court proceedings were withdrawn by the police in four instances.

Separate and distinct were a number of minor contraventions which concerned, in the main, failure to clean all tobacco buildings thoroughly.

Noxious Weeds

Spraying operations by the Department of National Parks and Wild Life Management has reduced very markedly the amount of *Eichornia crassipes* in the Makabusi River, but regular spot spraying will have to be continued for a long time to come to kill off newly germinated seedlings. The only other known sources of infestation by this weed are in dams and rivers in the Bindura, Sinoia, Headlands and Odzi areas; they are in the process of being cleared.

Salvinia auriculata is still to be found in small amounts on nine farms in the Macheke, Rusape, Umtali, Tsungwesi and Odzi areas despite attempts that have been made to eradicate the weed.

Most local authorities have promulgated their own by-laws regarding the eradication of *Lantana camara,* the notable exception being Salisbury Municipality.

Trials on the control of aquatic and crop weeds and also on the control of *Lantana camara* have taken place in a number of experiments.

Tobacco Branch

General

Training

Due to the reduction in the number of trained officers training must assume even greater importance than it did before.

Fifteen officers, including five officers from Zambia, completed their in-service training; twenty officers, including one from Research and Specialist Services, and an additional five officers from Zambia are undergoing in-service training in 1964–65.

Five African extension assistants are undergoing practical Burley and Turkish training with the Tobacco Research Board at Trelawney Research Station in 1964–65.

Burley and flue-cured courses were organized for farmers at the university and some 60 farmers attended both courses.

During the year a Tobacco Training Centre was established at Domboshawa to replace the facilities at Mochipapa in Zambia.

Visits

Some 1,096 visits were undertaken by officers of the Branch stationed at head office. Due to shortage of staff for most of the year, the activities of the Branch were considerably curtailed.

Inspections of commercial grading sheds are now only carried out at the request of the Southern Rhodesian Tobacco Marketing Board.

Tobacco Research Board

Liaison with the Tobacco Research Board has been maintained and this liaison is likely to improve considerably when Mr. S. Ingham takes up his appointment as liaison officer with the Board. The Department is greatly indebted to the Board for providing lectures for in-service training of staff and at farmers' short courses.

Trained staff regularly visit the Board's stations in Rhodesia during the season and thus maintain close contact with the work in progress.

Members of the branch also attended the annual planning conferences on Virginia, Burley and Turkish tobacco, and accompanied the Tobacco Research Board teams on their annual lecture tours to the districts.

Field Trials

Once again the following off-station trials were run in conjunction with the Board on farms:

Flue-cured tobacco:		
Liming trials	2	Mashonaland North
Burley tobacco:		
N.P.K. trials	5	Eastern
	1	Mashonaland North
	1	Mashonaland South
	1	Victoria Province
Spacing and nitrogen trials .	2	Henderson Research Station and Chibero

Turkish tobacco:

Date of planting	3	Matabeleland
	1	Mashonaland South
Rates of N.P.K.	1	Matabeleland
Density of stringing	2	Matabeleland
Fumigation and rates of nitrogen	1	Matabeleland
Soil fumigation observation	1	Victoria
TOTAL:	17	

Tobacco Organizations

Close liaison is being maintained with the President and councillors of the Rhodesia Tobacco Association and with the Chairman of Tepcor. The Chief Tobacco Extension Officer attended all meetings of the South-Western Tobacco Marketing Board. A limited number of classification courses for farmers were held by the Board and proved very popular. The Grading Consultant of the Board held a number of field days on grading in co-operation with the Department. The classifiers of the Board also assisted with the in-service training of staff and this was of great benefit to our officers.

Liaison with the Rhodesia Aromatic Tobacco Growers' Association has not been good, mainly due to the fact that the Turkish Tobacco Extension Officer's post has been vacant for the last seven months. However, the leaf specialist of the association, Mr. Pavlovitch, has worked closely with the staff of the Department and assisted with the training programme on leaf quality aspects.

Very close co-operation has been maintained with the Burley Tobacco Growers' Association and the Chief Tobacco Extension Officer attends all meetings of the association.

Close co-operation has been maintained with the tobacco officers of the Zambian Department of Agriculture.

Visits and Tours

Application has been made under the auspices of the S.C.A.A.P. for a Burley tobacco expert from Canada to visit Rhodesia in 1965, to assist and guide extension officers and farmers in the producing, curing and grading of Burley tobacco.

The Chief Tobacco Extension Officer completed a study tour on the Burley handling methods in the United States of America, Canada and Europe. The information gained has been of great help and assistance to us in this country.

THE TOBACCO CROP: 1963–64

Flue-cured Tobacco

Seedbeds.—Generally up to the early rains these were good but there are still parts of the country where management could be improved. Fumigation could still be more widely practised.

Cutworm was again a troublesome pest. Early rains caused rapid growth of seedlings and in many cases it was impossible to harden off plants. Ideal planting conditions however, alleviated this problem to some extent.

Land Selection.—Most farmers are aware of this as a major factor in crop production and more attention is being paid to this aspect. Second-year tobacco is gaining in popularity as many growers are of the opinion that quality is better on second-year land. While prices maintain their present low level there is little that can be done to halt this practice.

Land preparation is improving, but the standard of late ploughing and subsequent land preparation still leaves room for improvement.

Crop Management.—A large part of the crop was planted early and proved to be the best, although in certain areas due to lack of rain in the later stages of the crop, yields and quality was affected.

Fertilizer rates were in line with Tobacco Research Board recommendations generally, although in some highveld areas there is a tendency to increase the nitrogen levels using

nitrate-of-soda as this is claimed to give better growth and quality. Liming is being carried out more extensively and farmers are becoming more aware of this need.

Topping was on the high side with some tendency to be late. This in many districts was a mistake as the top leaves did not fill out well.

Suckering was kept well in hand and in some areas an increase in the use of oil emulsion suckering compounds was noted. In general, however, most farmers will still hand sucker unless labour shortages prevent them from doing so.

The climate however overrode all cultural practices and was mainly responsible for the weights recorded throughout most districts.

Reaping and Curing.—Ripening was rapid in January when the drought broke and a considerable amount of leaf was lost in the land. The position was eased when the rains stopped but then again ripening was too slow and in some cases leaf had to be discarded on the lands.

The effect of climate on plant growth made this a very difficult season for curing and many barns were over-packed due to a change to vertical string hanging, which aggravated the situation.

Slated tobacco was common from all districts and no curing technique could overcome this. There is a tendency to blame vertical string hanging for much of the trouble and a move away from this method is likely during the coming season.

There are few barns being built this season, but an interest is being shown in long, low barns in many areas, especially where extravagant claims are made as to their curing advantages.

Grading and Handling.—This on the whole was reasonably well done although the quality of the crop made these operations difficult. There is no doubt that good grading paid dividends this year on the floor. Contract gangs were used by many farmers to beat quota introduction and these seem to work well. Layouts and organization of grading sheds was the subject of scrutiny by the Work Study Section and some advances have been made. Presentation for sale was normal and in general well done.

Pests and Diseases.—Cutworm was the main pest in the lands and in seedbeds, and this pest is becoming increasingly common. Dieldrin gave little control in many cases.

White mould was the commonest disease in the lands but was not the threat it originally appeared. Spot diseases were not troublesome this year except in certain districts such as Trelawney and Darwendale. Barn rot was sporadic in its occurrence and was mainly due to overpacking.

GENERAL CROP STATISTICS: RHODESIA

Number of growers	= 2,728
Estimated total acreage planted	= ± 253,000 acres
Average acreage per grower	= ± 92.7
Average crop per grower	= ± 110,695 lb.
Average yield per acre	= 1,194 lb. per acre
Weight sold	= 301,975,000 lb.
Average price per pound	= 25.80d. per lb.

Turkish Tobacco

The crop in the main growing areas of the Midlands and Matabeleland was a mixed bag and the results were mainly influenced by the weather.

Seedbeds.—These were on the whole good with little complaints about the management. Little pest and disease problems were encountered.

Lands.—Land selection and preparation are receiving more attention but there is still scope of improvement for newer growers.

Fertilizer recommendations were based mainly on soil sample analysis and several areas are requiring maintenance lime dressings.

Planting Out.—There was a tendency, especially in the lower rainfall areas, to plant in mid-November, which is earlier than recommended, and refilling was necessary in many cases. Inadequate setting-out watering also contributed to this.

Pests and Diseases.—The major pest in the lands was leaf miner which caused severe damage in some cases. Reports were also received that this pest was active even in cured leaf.

Reaping.—While the lower half of the plant was reaped satisfactorily, the sudden cessation of the rains made reaping of the top half difficult. Cold nights and odd showers made ripening erratic.

Curing.—Most growers have converted to the rack system due to the greater control it gives over the cure. In general, curing was satisfactory, but some growers tended to expose the leaf too long, with the result that it was dried rather than cured, causing a considerable amount of green leaf.

Grading and Presentation.—Storage and baling facilities could be improved upon to ensure better handling of the tobacco. However, grading and baling were carried out in a satisfactory manner.

CROP STATISTICS

	African	*European*	*Total*
Number of growers	3,239	228	3,467
Acreage planted	764	1,336	2,200
Average yield per acre	344	850	640
Total weight sold (lb.)	263,435	1,133,978	1,400,000
Average price per pound (pence) . . .			35.68

General.—Considering the season, this crop did well and there is ample scope for expansion. Good prices and reasonable yields have been achieved by many producers and has further stimulated interest in this crop, particularly in the African areas where it could be one of the major cash crops.

Burley Tobacco

This crop expanded rapidly this season and in general had the same difficulties with climate as the flue-cured crop. Many crops of excellent quality were produced, notably that of the lowveld areas under irrigation.

Little trouble was experienced with seedling production, although many new growers will improve with experience. Some beds were patchy and grew rather unevenly but sufficient seedlings were on hand by planting time to meet requirements.

Planting out took place generally after rains had fallen in November and growth was good while the rains lasted. Crops on the lighter soils also grew well this year.

Necrotic Y virus was only confirmed once during the season although several instances of ordinary virus Y were reported.

White mould also caused a problem in certain areas but leaf affected with white mould appeared to sell quite readily.

Leaf curl was serious in the lowveld area and may well prove to be a limiting factor in the production of Burley in that area.

Of the insect pests leaf miner was the most serious and in view of the close proximity of Burley crops to potato producing areas this is likely to continue.

Priming of the lower leaves was restricted to the bottom six leaves due to climate and the remainder of the plant was generally stalk cut for curing. Stalk spearing was the most generally used system of handling, but it was soon obvious that the biggest headache was the actual loading of the barn. Ladder hanging, although theoretically good, was full of practical difficulties and many growers will be installing tiers this year.

Packing rates were higher than normal, but the dry weather compensated for this. Late reaped crops dried out too quickly and gave a variegated leaf. Barn space is still critical, however, and this is probably one of the factors limiting crop expansion.

Difficulty was experienced by growers in getting the tobacco into sufficiently good condition to avoid excessive breakage. This problem will be with us until a suitable portable means of humidification is evolved.

Grading of the crop was good on the whole considering the limited experience of growers, and considering that grading and baling space was not adequate on many farms. Grading techniques could be improved to increase output.

Baling and presentation of the crop was good, although the practical difficulties of grading and baling a small crop, sometimes from an acre, are not inconsiderable.

Sales were the one buoyant feature of the tobacco floors this season and all grades sold very well, even drought-stricken tobacco.

CROP STATISTICS

Number of growers	367
Acreage planted	2,680
Average yield per acre	943
Total weight sold (lb.)	2,528,260
Average price per pound (pence)	28.76

Irrigation Branch

Staff

The present staff, specializing in irrigation is as follows:

1 Chief Irrigation Officer (Head Office).
1 Group Irrigation Officer (Manicaland T.T.L.).
3 Irrigation Extension Officers (Midlands, Victoria, Manicaland and Matabeleland).
6 Extension Officers (T.T.L. Schemes).
1 Assistant Extension Officer (T.T.L. Schemes).
7 Supervisors (T.T.L. Schemes).
21 Extension Assistants (T.T.L. Schemes).

With present trends pointing to increased interest in irrigation by European and African farmers alike, and with investigations taking place for large-scale irrigation schemes in both the high and lowveld regions, it becomes obvious that a substantial increase in staff is not only desirable, but essential if this Department is to keep pace with irrigation development over the next few years.

Weather Conditions and Water Supplies

In general the 1963–64 season was one of extremely poor rainfall, with the result that most rivers started flowing late in the season and tended to dry up much earlier than usual during the winter months. This caused restricted irrigated acreages in most areas and abandonment of winter irrigation in a few isolated cases.

General Observations

The very marked increase in the interest shown by European and African farmers alike in the irrigable potential of the areas in which their farms are situated can be ascribed partly to the hardships encountered by dryland farming during the past poor rainfall season, but no doubt the fall in tobacco prices has caused many farmers, who previously looked upon tobacco as their main or sole source of income, to reassess the potential of their land and plan for as much diversification as possible. Irrigation farming offers the possibility of a wide choice of suitable crops with the added advantage of an almost assured crop return, and it is thus not surprising that there has been a greater-than-usual number of requests for assessments, investigations and actual layouts for individual farm schemes.

In addition to this it is gratifying to report that there has also been a considerable amount of interest shown in large-scale irrigation schemes, such as the Wengi Scheme at Glendale, the Bindura-Shamva Scheme, the Raffingora Scheme and a host of others in both the high and lowveld regions.

Requests for investigations into the potential of these large-scale schemes are being received at a far greater rate than the Ministries of Water Development and Agriculture can handle.

In order to direct large-scale investigations on a national priority basis, it has been necessary to set up a committee, known as the Irrigation Co-ordinating Committee.

This committee is under the chairmanship of the Projects Engineer of the Ministry of Water Development and has on it representatives from Agriculture, Conservation and Extension, Internal Affairs, the Treasury and the Rural Land Board. Its functions are mainly to examine preliminary reports on all schemes involving the expenditure of public moneys, to decide whether further investigation is justified, and, if so, to determine what priority rating such investigation should receive, based on its potential effect on the national economy.

Farming Areas: Irrigation Extension and Development

Victoria Province

The rapid development in the south-eastern lowveld has continued. Approximately 14,000 additional acres were planted to sugar during the year. The main development has been in the Mtilikwe Sugar Company land and on Triangle and Hippo Valley estates.

Thirteen new settlers were established on the Hippo Valley Estate, most of whom have made a start on their first 50 acres of cane. Arrangements are under way for the establishment of an additional 24 settlers early in 1965.

At the Umshandige Irrigation Scheme, the situation is again becoming critical, with the dam at present less than 30 per cent. full. If another poor season is experienced then water restrictions will have to be brought in again.

Investigations into future large-scale development in this province chiefly concerns the Lundi-Tokwe and the Lundi-Tendi dams, which have top priority over the rest of the area planned by the Sabi-Limpopo Authority.

Matabeleland Province

Considerable expansion has taken place in the last year and it is estimated that some 4,000 acres are now under irrigation. This rate of expansion is expected to be maintained or increased during the coming year.

On the Umgusa Irrigation Scheme water rationing had to be introduced, with a consequent drop in acreages planted and yields obtained. Irrigators on the sandier soils were those most severely affected. The scheme continues to centre mainly around the production of lucerne and fresh vegetables for the Bulawayo market.

Numerous large-scale irrigation schemes are under investigation. Their main interest will be in summer-irrigated maize to be used in a beef-fattening programme.

Mashonaland North Province

Following on the raising of the Mazoe Dam, the B.S.A. Company's Mazoe Citrus Estate has embarked upon an extensive development plan. The acreage under citrus has been increased to 3,500 acres and will continue to increase by approximately 110 acres per annum for the next five years.

Farm-scale irrigation is also on the increase and it is pleasing to report that farmers who formerly did little to exercise their existing rights are now putting these to much fuller use. There are, however, still a considerable number of water right holders who only partially exercise their rights.

The Wengi Scheme is receiving top priority for investigation and the final detailed report is in the process of being drawn up.

The Bindura-Shamva Scheme, estimated to cover 56,000 acres of irrigable land, is in the early stages of investigation.

Mashonaland South Province

No large-scale irrigation development is at present planned for this area, and in comparison with other provinces there is only a slight increased interest shown in irrigation. The Macheke group has put a considerable amount of thought and effort into promoting interest in irrigation, and the results so far have been encouraging.

Midlands Province

The total area planted to irrigated crops in this province has increased during the last year by 704 acres, bringing the total now under irrigation to 3,900 acres. Most of this expansion took place in the Que Que group, where a further increase of 1,000 acres is anticipated during 1964–65. The main crops grown are vegetables, citrus, lucerne and maize.

Wheat had not previously been grown in the area, but the irrigators at Sherwood have planted 175 acres (out of their total of 215) to wheat, which promises to yield in the vicinity of 15 bags per acre.

The major development in this province has been on the Sherwood Block, Umniati/Sebakwe Intensive Conservation Area.

Manicaland Province

There is considerable interest in the Rusape District in irrigation and expansion is planned for deciduous fruit and vegetables. At present 1,400 acres are under irrigation in this group.

It is reported that management is improving, selection of land is getting more attention and application systems are being more closely related to soil types. The correct use of water in orchards is also being recognized.

Interest in irrigation in the Purchase Area is strong, but actual development is limited by the shortage of capital and credit.

A water survey was caried out for the Rusape Intensive Conservation Area and similar surveys are being planned for the Inyanga and Chipinga intensive conservation areas.

TRIBAL TRUST LAND: IRRIGATION EXTENSION AND DEVELOPMENT

Victoria Province

The only Tribal Trust Land scheme in this province is the Chilonga Scheme, situated on the south bank of the Lundi River about seven miles downstream of Hippo Valley. The scheme has not as yet functioned. Subsidiary concrete canals have been constructed to cover 200 acres, this being the first stage of this scheme. The construction was completed several years ago but, for various reasons, the scheme was not brought into operation. A start has been made on the stumping, clearing and cropping of a 20- to 30-acre trial block and it is hoped that by next summer this scheme will be well on its way to becoming a fully implemented summer supplementary scheme.

This irrigation scheme will serve a very useful purpose as a pilot scheme in Tribal Trust Land which has a large irrigation potential when the full Sabi-Limpopo Authority development plan is implemented.

Matabeleland Province

There has been great interest in this province in the development of irrigation schemes in the Tribal Trust Land.

The need in Matabeleland is not so much for large-scale schemes based on a cash-cropping system, as for numerous small-scale schemes, allowing for only an acre or two per irrigator to grow food crops to meet the needs of his family and a small surplus for sale to his less-fortunate neighbours.

Numerous such schemes have been, or are in the process of being investigated and reported upon. Towards the end of the 1963–64 year funds were made available from the African Development Fund for the development of the following schemes; and in most instances construction is under way:

(i) Daluhanga—80 acres (Beitbridge T.T.L.).
(ii) Shashi Extension—200 acres (Beitbridge T.T.L.).
(iii) Kongoni—80 acres (Gwanda T.T.L.).
(iv) Rustler's Gorge—100 acres (Gwanda T.T.L.).
(v) Illambo—100 acres (Wankie T.T.L.).
(vi) Mwemba—100 acres (Wankie T.T.L.).
(vii) Mzingwane—150 acres (ex-compensation fund from Bulawayo Municipality).

(viii) Zinapi—16 acres (Lupane T.T.L.).
(ix) Tsongokwe—40 acres (Lupane T.T.L.).

In addition to the above, two community schemes have been developed in the Beitbridge Tribal Trust Land at Tongwe (20 acres) and Kwalu (30 acres). Both these schemes have been developed by the communal effort of local farmers with this Ministry providing the technical advice and layout planning.

Midlands Province

There are three relatively small Tribal Trust Land schemes in this province, *viz.* Sachipiri (112 acres), Mwerahare (37 acres) and Nyahoni (72 acres). Due to a shortage of staff these schemes have suffered from a lack of supervision, with a consequent falling off in management. They have distinct possibilities of providing a high standard of living for the irrigators.

Manicaland Province

There are 10 irrigation schemes totalling 5,269 acres in Manicaland.

"Management committees" have been inaugurated at Chibuwe and Devuli and it is intended to introduce similar committees on other schemes. The purpose of these committees is at present to foster an interest among the irrigators in the problems that arise in the efficient operation and maintenance of the scheme, to bring about an appreciation of the economic need for the higher paying cash crops and the general need for a more efficient approach to irrigation farming, eventually leading to these schemes being operated on a community development basis.

A brief report on the individual schemes follows:

Nyamaropa.—Situated on the Moçambique border in the Inyanga District, this scheme was opened up for settlement some three years ago. It is a gravity-fed scheme and has a potential irrigable area of between 1,700 and 1,800 acres. Political intimidation seriously undermined the scheme at the start and only a handful of irrigators could be found who were prepared to stump and clear lands in spite of threats from intimidators. Indirectly this has had the effect of confining would-be irrigators to those of the more progressive and ambitious type, with the result that the standard of agriculture practised on this scheme is well above average. All plot holders use artifiicial fertilizers and pay careful attention to such items as plant spacings, etc., and look upon traditional crops as secondary to the more important cash crops. The acreage under irrigation has increased steadily. It has risen from 409 (September, 1963) to 820 (September, 1964), but is now reaching the stage when all the vacant or virgin land has been allocated.

Chibuwe.—This is a 1,000-acre scheme on the lower Sabi River. Water is pumped from the river and from a gravity canal fed by the river. Nine hundred and fifty acres are flood irrigated and a trial block of 50 acres of sprinkler irrigation has been in operation for the last six to seven years. The results have been somewhat disappointing. The equipment has stood up well but the irrigators tend to sit back and relax once planting is over. Political interference at Chibuwe has caused yields to decline slightly over the last few years whereas previously a steady improvement has been apparent.

Mutema-Tawona.—This is a joint pumping and gravity scheme of 800 acres situated near the confluence of the Sabi and Tanganda rivers. Half of the lands are irrigated by gravity canal from the Tanganda River, and the remaining half by pumping from the Sabi River. Use is also made of a large-diameter borehole which delivers approximately 30,000 gallons per hour. The supply from the Tanganda River is somewhat precarious in the dry season and the main canal has suffered from serious washaways as a result of heavy floods. The standard of farming, for many years well below average, has in the last two years risen to slightly above average and is continuing to improve.

Devuli.—This scheme of 538 acres situated on the west bank of the Sabi at Birchenough Bridge receives its water by gravity from the Devuli River. Although designed as a summer supplementary scheme, it does in most years operate as an all-the-year-round scheme. This

ear, however, the river ceased flowing early in April and no winter crops were possible. resident extension officer was moved to the scheme during the year, with the result that ne dry winter months have been usefully employed in land levelling and preparation and anal cleaning. The all-round improvement in the attitude of the irrigators is a credit to the eld staff.

Murambinda Scheme.—This is a small 84-acre gravity-fed scheme from the Mwerahare River in the Buhera District. It has, up until this year, been somewhat neglected, but oncentrated efforts now have tended to increase both interest and efficiency by the irrigators. Both Burley tobacco and cotton have been introduced and have given above-average yields. As a result of this it is anticipated that acreages planted to these crops will increase considerably next year.

Nyanyadzi.—This is one of the oldest and the most publicized schemes in the country. The acreage under irrigation has been increased from 750 to 830 acres. Water supply is by gravity from the Nyanyadzi River and augmented by pumping from the Odzi River during he dry season. Burley tobacco is becoming an increasingly popular crop; six acres were planted this year, giving an average yield of 1,765 lb. per acre with a gross average income of £209 per acre. The green bean acreage increased from 118 acres in 1963 to 192 this year. The average yield varying from 3.1 tons per acre from the second planting to 0.93 ton for the third planting which was badly hit by frost. Interest in this crop continues and no difficuty is experienced in filling contract quotas.

Umvumvumvu.—This is a small 250-acre scheme gravity irrigated from the river of the same name. One-third of the scheme is situated on deep rich alluvial soil and the remainder on very indifferent granite sands. In spite of this, yields are maintained at the average of the more favourably sited scheme elsewhere in the province.

Mutambara.—This is a 300-acre scheme in the Cashel area, gravity fed from the Umvumvumvu River some 15 miles upstream of the Umvumvumvu Scheme.

Serious water shortage since its inception tended to upset the smooth running of the scheme. Early in 1963 a five-year improvement scheme, consisting of four miles of lined canal, an additional night storage dam and a syphon was completed. Water supplies are now adequate. The response to this by irrigators has not come up to expectations, with the majority still preferring to adhere to their tradional cropping programmes. A few of the more progressive farmers however are growing cotton and Burley tobacco. Four and a half acres of the latter were planted and gave an average yield of 2,477 lb. per acre which realized an average gross income of £249 per acre. There appears to be a tremendous future for this scheme in Burley.

Maranke.—This is an 850-acre scheme situated in the Maranke Tribal Trust Land and is gravity fed from the Odzi River. Construction of the 15-mile-long canal was commenced in pre-war days as a first step in supplying the centre of the area with domestic water. The scheme was abandoned in the early '50s and following on this an attempt was made to use the canal for irrigation. The area commanded consists mainly of coarse granite sands entirely unsuited to the flood irrigation which is practised. This causes heavy leaching of the soils and has resulted in a steady decline in yields over the last 10 years. The main crops produced are maize and wheat with extremely poor average yields of 4.0 and 2.8 bags per acre respectively.

The introduction of sprinkler irrigation would considerably improve conditions, but the cost to Government would be prohibitive. The only solution appears to be the introduction of small diesel- or petrol-driven sprinkler systems purchased and owned by the irrigators. To this end, one of the more progressive irrigators has been loaned such a plant and is conducting a sprinkler *versus* flood trial on wheat and maize.

Nyachowa Scheme.—This is a small 114-acre scheme some 12 miles from Umtali. It is gravity fed from the Nyachowa River. The soils are variable and yields of maize and wheat are disappointingly low (5.0 and 2.2 bags per acre respectively). Fresh vegetables for

hawking in Umtali are the main source of income but no records of yield or income pe acre are available.

Irrigated Crop Production

In the farming areas the high diversification of irrigated crops continues with a recen bias towards cotton and maize in the summer and wheat in winter.

New irrigators are mostly looking towards cotton as their main cash crop, followed b maize and then wheat. This is a sound policy, as both lucerne and potatoes under irrigatio are nearing the point where existing acreages satisfy the local market.

The acreage of supplementary irrigated tobacco has also risen. Midlands report a three fold increase over last year's figures.

In the Tribal Trust Land there has been a steady increase in the acreages planted t cotton, Burley tobacco and seed production.

In Manicaland it is expected that Burley will increase this season from its present 1 growers (11.16 acres) to 66 growers (45 acres).

Cotton acreages increased from 382 acres in 1963 to 625 in 1964 and is expected to b near the 1,000-acre mark in 1965.

Seed production was of the order of 1,145 acres (beans 1,058, lettuce 70 and tomatoe 17) and would have been several hundred acres higher but contract acreages were cancelle at Devuli owing to lack of water.

Details of acreages planted, total and average yields for all Tribal Trust Land scheme are listed on attached Table IX (Appendix X).

Irrigation Training

Due to the fact that the post of Chief Irrigation Officer remained vacant for the greater part of the year, the short two-day courses planned had to be cancelled.

A full ten-day irrigation course attended by 18 officers of this Department was held i Salisbury in September.

Animal Husbandry Branch

Staff

During the first half of the year, in particular, it was necessary for staff to familiarize themselves with "new" conditions after amalgamation of the two former ministries of agriculture.

Formal conferences and one tour of research stations and field trials were held for all animal husbandry extension officers. In addition periodic visits to research stations in the country were also carried out.

Staff Training

In-service training courses on animal husbandry were held for departmental staff. The main emphasis in these courses was on beef production, but this total also included two sheep courses at national level. The Animal Husbandry Extension Officer for Mashonaland was also involved in a course on efficient use of trek-oxen, a subject of considerable importance in the Tribal Trust Land and Purchase Area in Mashonaland.

In addition, animal husbandry extension officers also addressed a number of staff conferences at provincial and group level on various aspects of animal husbandry.

Sixteen advisory circulars and notes were issued to staff in addition to eight reprints of technical articles and nine sets of lecture notes at national courses. The large number of handouts at in-service training courses in the various provinces was not recorded.

Field Days, Discussion Groups and Demonstrations

Animal husbandry extension officers attended and lectured at 104 of these functions during the year. Attendance was only recorded at 45 of these, and numbered 2,780.

It appears that less of these functions were held during March, April and May than is normal for that time of the year, and this is ascribed to the numerous staff changes consequent on amalgamation. To some extent this must also be ascribed to the fact that animal

husbandry extension officers who had previously served only in the Tribal Trust Land and Purchase Area were at that time not yet well known in the European farming areas.

Five specific livestock courses were held for farmers, but in addition livestock training featured at a number of other more general farmer-training courses in African areas.

Relatively few individual farm advisory visits were made by officers of the branch.

Members of the branch judged livestock at a number of agricultural shows, and also assisted in judging several whole-farm and livestock production competitions.

Field Trials and Test Demonstrations

The following trials on livestock production are in progress:

(i) The effect of various levels of winter supplementary feeding and stocking rates on the lifetime performance of ranch breeding cows.

(ii) Aphosphorosis trial in the Fort Rixon area.

(iii) Early weaning of ranch beef calves.

Numerous livestock test demonstrations were carried out, with emphasis on feeding steers and old cows for slaughter, and on supplementary feeding in the Tribal Trust Land and Purchase Area. The majority of these test demonstrations were conducted in the Victoria Province, where they have been eminently successful and have resulted in a striking increase in these practices. In that province the number of African farmers stall-feeding cattle as a result of these test demonstrations has increased from 10 in 1962-63 to 164 in 1963-64, and the number of cull cows and oxen being fattened has increased from 50 to 287 over the same period. Many farmers are watching with interest and a marked increase in this practice is likely next year.

LIVESTOCK IMPROVEMENT SCHEME

The payment of grants to farmers under the Livestock Improvement Scheme was discontinued with effect from 1st July, 1964.

During the year ended 30th June, 1964, the number of grants paid was as follows:

Number of Applicants	*Number of Registered Bulls*	*Number of Unregistered Bulls*	*Number of Rams*	*Number of Boars*
50	94	—	—	—
16	—	29	—	—
16	—	—	31	—
10	—	—	—	10

The total funds voted by Parliament for payment of livestock improvement grants was utilized, and the amount of grant paid on individual applications was restricted below the ceiling in order to meet commitments.

The Beef Recording Scheme continues to operate. The scheme was inaugurated in November, 1962. To date weaning weight records have been received in respect of 2,800 calves and completed records in respect of 1,200 animals. During the year under review there has been no increase in the number of animals recorded and this is ascribed to a shortage of staff and numerous staff changes.

Details of livestock importations are given in Appendix IV.

GENERAL LIVESTOCK INFORMATION

Beef Cattle

Climatic Condition.—The year was characterized by an exceptionally short rainy season, with total rainfall well below average in practically all areas, a long and severe dry season, and an exceptionally cold winter.

While the onset of the rain was comparatively early in Mashonaland South Province, this was not the case in most other areas. Nonetheless, the first half of summer was generally favourable for cattle in the medium and higher rainfall parts of the country, and stock in these areas were in good condition by early February.

The rainy season came to a very premature close, at a time varying from January March in all but a very few isolated areas.

In the south-western areas it was obvious by January that a serious drought situatio was being faced, and drought relief measures were set in motion. Due to this foresig approximately 50,000 head of cattle were moved out of the drought-stricken areas. Of th total 44,000 were moved out of the Umzingwane Western Group, and this amounted some 20 per cent. of the total cattle population of that group. The European farmers a to be congratulated on the timely action taken. Unfortunately the Purchase Area and Trib Trust Land farmers were slow to take action; despite the sale of greater numbers of catt than normal the numbers sold were still insufficient to avert the crisis, and numerous catt deaths have resulted in these areas.

Water supplies for cattle were very poor and many dams dried up. On many farm throughout the country grazing was in short supply during the latter part of the dry season There is no doubt that losses due to poverty would have been very high indeed had ther not been a very marked increase in the amount of winter supplementary feeding practise on European-owned farms.

Interest in Beef Production.—There is very definite evidence of increased enthusiasm for beef production amongst European farmers ,particularly in the higher rainfall area of the country. This is ascribed to various factors:

(i) The comparative buoyancy of the beef market, particularly in contrast to tobacc prices. The announcement of the minimum beef prices for cattle delivered to Col Storage Commission works, which are to take effect from 1st January, 1965, appear to have considerably increased the interest in beef production.

(ii) The Cold Storage Commission support finance scheme for young stock. Prices o auction sales for stock qualifying for support finance has been enhanced, and larg numbers of cattle have found their way on to farms which were previously under stocked, as a result of this scheme.

(iii) Technological advances in the pen-feeding of slaughter stock at high levels o concentrates.

(iv) The emphasis placed by the Agricultural Production Committee and intensive conservation area committees on the importance of increased beef production t the national economy.

The beef cattle industry in European farming areas is at a critical stage of development On the one hand the after-effects of the drought make it probable that less steers in the older age groups ($3\frac{1}{2}$- to $4\frac{1}{2}$-year olds) will come forward for slaughter during the nex year or two, and de-stocked drought-stricken areas will have to be restocked. On the other hand the technological advances in pen-feeding younger, lighter animals, combined with the increased beef prices and the enthusiasm amongst producers, make it possible to bridge the gap (in total numbers of slaughter stock from these areas) that would otherwise resul from the drought. The greater part of the country, with the exception of the major cropping areas, is now fully stocked with beef cattle. Major increases in production must in future be affected by a quicker turnover and increased take-off from the national herd and the key-factor in this will be the number of calves produced. High standards of management and economic supplementary feeding of breeding stock are vital aspects if this is to be achieved. The final outcome will depend to a large extent on increased advisory work in this field.

There has not been the same measure of increased interest in beef production in the Purchase Area and Tribal Trust Land. Good progress has, however, been made in certain areas in the lower rainfall parts of the country. In Victoria Province, for example, 87 cattle clubs and interest groups are now established. In most areas, however, and particularly in the higher rainfall regions, cattle are kept primarily as a source of draught power and as a source of capital wealth to be drawn upon only as specific needs arise. Changing these attitudes is essentially a very slow process. Realizing the importance of draught power

1 these areas, effort on the part of staff has been directed at encouraging more efficient se of available draught animals. Inefficient use of draught power is a definite limitation o the slaughter take-off from these herds.

In order to encourage a greater slaughter take-off, small groups of Purchase Area armers in various parts of the country have been encouraged to co-operatively market arcels of selected slaughter stock direct to Cold Storage Commission works. In certain istances these animals have been fed prior to slaughter. In most instances the African armers concerned have been well pleased with this arrangement.

There has been a fair amount of interest amongst Purchase Area farmers in the Cold torage Commission grazier scheme.

Serious problems which place a definite limitation on productivity and mitigate against ncreased interest in cattle in tribal areas, are:

(i) Widespread and severe overstocking of communal grazing land, aggravated by the fact that ever-increasing areas of the better land are being brought under the plough.
(ii) The communal grazing system.
(iii) Long distances between dipping tanks.

Systems of Production.—An earlier apparent trend for European producers to discontinue breeding beef cattle in favour of raising and/or fattening steers, appears more recently to have been halted, if not reversed. During the latter months of the year under review, there has been an increased demand for breeding stock. This is an encouraging trend, particularly since the demand for feeder steers is likely to increase in future and the supply of such animals is likely to be a limiting factor in national breed production. The need to increase calving rates is obvious.

Management.—Management of beef cattle continues to improve in European-owned herds in most areas. Progress has, however, varied considerably from one area to another and has been related to the amount of time which staff have been able to devote to extension work in this field, particularly through the medium of discussion groups and similar functions. In some cases this has been very little ,and progress has been slow; in other areas very good progress has been made, but generally there is a good deal of room for further improvement in management.

In certain areas of Matabeleland notable progress has been made in improving veld management systems with particular reference to summer stocking rates, resulting in improved summer weight gains. The increased use of cattle scales is playing an important role.

Many beef producers are weaning calves at five to seven months of age, which is somewhat earlier than previous practice. This has enabled cows to gain condition before the onset of winter.

Early weaning of calves, at about 100 days of age, which has been tried in a few isolated cases, with an apparent measure of success indicating that further detailed investigation of this technique would be desirable.

There has been very little improvement in the poor standard of management of cattle in tribal areas. Staff have, however, done a vast number of inoculations, dosing, castration and dehorning operations, and have demonstrated these practices to groups of farmers. (See Appendix X, Table 5.)

Progress in improving management in the African Purchase Area has been variable, but good in some areas.

Supplementary Feeding.—There has been a very marked increase in the number of cattle receiving supplementary protein (and urea) in the dry season in European farming areas. Liquid urea-molasses-salt licks have also been used in many areas. Unfortunately, feeding was commenced too late in many instances to give greatly increased productivity, particularly in such a severe dry season. However, there can be no doubt that it has averted many deaths from poverty, and the practice is likely to be repeated in future years.

Advice has been given as to the way in which feed may be most economically used b selective supplementary feeding of breeding stock. In the Charter group alone, some 10,00 pregnancy diagnoses were undertaken for this purpose.

Although supplementary feeding is only practised on an extremely limited scale in th African Purchase Area, there have been notable increases in the practice in certain localitie

Pen-feeding.—A notable feature has been the very widespread keen interest in *ad li* concentrate feeding of slaughter stock, which has been investigated on Henderson Researc Station and practised on a large scale by one major farming concern. In addition, a limite number of farms have fattened trial groups of steers on this system. Results have been ver satisfactory indeed, despite a few relatively minor snags, and the system is likely to be widel practised in future years.

There has been a marked increase in the amount of pen-feeding practised in the lowvel of Victoria Province.

There has also been a marked increase in the numbei of mature oxen and cull cow fattened by African Purchase Area farmers and tribal area farmers in the Victoria Province although this is still on a comparatively small scale. (See Appendix X, Table 5.)

Breeding.—Exotic beef breed bulls were in keen interest demand from European farmers many of whom are cross-breeding or grading up with these bulls from herds of predomin ently Africander and Native-type females. An increasing number of farmers are now follow ing a defined and planned system of breeding with these animals, though there remain a strong tendency amongst some farmers to attach relatively too much importance to breedin and too little to feeding and management in achieving increased production.

Field officers have continued to assist African Purchase Area farmers and tribal are farmers to select bulls for breeding purposes. (See Appendix X, Table 5.)

The Mrewa Breeding Station was closed down during the year, and the Artificia Insemination Centre has been moved from Msengezi to Domboshawa.

Dairy Cattle

Dairy farmers have experienced a difficult year. Late summer grazing was limited i both quantity and feed value; fodder production was lower than normal due to the poo rainy season and with the extended dry season fodder reserves were grossly inadequate on the majority of dairy farms.

Many dairy farms have gone out of production, while many of the remaining herd have increased in size. A large proportion of dairymen are looking increasingly to alternate additional farming enterprises, and a number are also putting beef bulls to dairy cows

There is evidence of lack of planning with regard to the number of replacement heifers that are raised in dairy herds, and there is room for further economy in this aspect in a number of herds. This would also increase the amount of feed available for producing cows

It is encouraging to note that dairy farmers are paying more attention to financia records. The main scope for reducing costs undoubtedly lies in the increased production o home-grown feeds, with emphasis on maize for grain and silage in most cases.

The standard of management and feeding is very high on the leading dairy farms in the country. It is notable that on these farms there is much less variation in total production from one year to the next than on other dairy farms.

Due to the fact that nutrition is a limiting factor in production on most dairy farms, and owing to the influence of this on calving interval and yield in subsequent lactations, it is likely that this adverse season will effect productivity of herds during the next year also.

Sheep

The past year was a favourable one for sheep, and where the standard of management has been good, sheep have done very well. The majority of flocks are still very small and consequently in many cases rank low in priority for supervision.

It is encouraging to observe that an increasing number of farmers in various localities are taking a very real interest in their flocks, improving management and increasing flock size. Increased usage of modern worm remedies has greatly assisted in controlling internal parasites.

Farmers are paying more attention to conformation in selection of rams, and there has been some increase in the practice of providing protein supplementary feed during the dry season.

A few farmers are showing interest in dual purpose sheep breeds. These are showing considerable promise under conditions where grass-seeds are not a problem, and where an adequate plane of nutrition is provided by supplementary feeding.

The Rhodesian Sheep Producers' Association has held several very successful field days.

Interest in sheep in the Purchase Area and tribal areas is mainly confined to the low-rainfall areas of the country. In these areas staff of the Department have given a good deal of attention to dosing and inoculation (particularly against enterotoxaemia) demonstrations, with generally good response. On certain farms in the Purchase Area in the Midlands, where good progress has been made, dosing and supplementary feeding are the rule.

Twenty-one Angora goats were imported from the Republic of South Africa on a trial basis, and have settled down well in the Shashi area.

Pigs

The number of pigs appears to have increased slightly. The majority of European producers are further improving efficiency and finding this enterprise reasonably profitable.

The annual Pig Industry Board field day was well attended.

The Department has given advice and encouragement to African producers. Increased interest and improving standards of management are reported from most provinces, though by no means in all areas within those provinces. In Victoria Province, for example, there are now eight pig interest groups or clubs in existence in African areas.

In Mashonaland a short course in pig production was held for African farmers.

Poultry

Interest is being shown in commercial poultry production in a few localized divisions of the African Purchase Area, and production in these has generally met with fair success. However, there is a tendency for price competition to become increasingly keen, and there is a need for more co-operative action if these small producers are to survive.

The interest amongst Purchase Area farmers in parts of the Midlands is such that residential short courses were arranged for a few of these people with European producers.

The bulk of production from European producers is in the hands of compartively few specialized medium- to large-scale producers.

Fish Farming

There has been virtually no new development of fish farming in European areas during the year.

African farmers, on the other hand, have shown a keen interest in fish farming and a considerable number of new fish ponds have been built and stocked during the year. While a large number of these dried up during the year restocking will probably take place quite rapidly. It is gratifying to record that European farmers have been most helpful in providing material for stocking ponds in African areas free of charge.

Beekeeping

General Progress.—Due almost entirely to the hard work and enthusiasm of the Apiculturist, interest in beekeeping has continued to mount and has in fact now reached such a pitch that one of the main problems is how best to restrain many persons from developing their beekeeping activities at a rate incommensurate with their experience.

Of the 800 beehouses now in existence in this country, approximately 500 were constructed in the year under review, including 15 by a single individual at Norton who, with 350 hives, is set to become an important commercial producer of honey and beeswax. It is

estimated that there are now in the vicinity of 15,000 hived colonies in Rhodesia. Five beekeepers' associations, with a total membership of approximately 400 and a central co-ordinating body, known as the Rhodesian Beekeepers' Council, are now in existence.

The Apiculturist is finding it increasingly difficult to satisfy the never-ending requests for guidance by beekeeping enthusiasts in all parts of Rhodesia and it is only too apparent that there is now an urgent need for the appointment of a beekeeping officer who can be trained as an understudy. Experience in Tanganyika has shown how much the beekeeping industry depends upon a high level of direction and how easily efficiency can wane if that direction is not forthcoming.

A significant step forward was the introduction during the year by the Apiculturist of the Anastomo and Distomo basket hives into Rhodesia from Greece. These are cheap to manufacture locally, easy to operate and generally eminently suited for use in African areas where the potential for beekeeping on a sustained yield basis is very good indeed—particularly in parts of the country such as Gokwe with an abundant natural flora. This type of basket hive has aroused a great deal of genuine interest among Africans and is currently being manufactured by the basketmakers of Seki Township near Salisbury under the supervision of the Apiculturist. An annual yield of about 40 lb. of honey is possible with one of these basket hives. The implications from the dietary point of view where Africans are concerned are obvious, let alone those which hinge upon the production of exportable surpluses of honey and beeswax in the future.

Training.—The most important function of the Apiculturist during the year was that of the training of staff, which was done through the medium of courses of eight days' duration, each divided into four two-day sessions.

Revision courses, each of one day's duration, were held every two and half or three months by the Apiculturist for the benefit of all officers who had completed their preliminary training to which reference has been made.

Sixteen officers can thus be said to have completed a course in the basic principles of beekeeping and by the end of March, 1965, this figure will have been increased to 37.

Because of an insistent demand by beekeepers that the Apiculturist should institute training courses for them also, two groups of eight persons each are currently undergoing the necessary practical instruction. Here again the individual courses are divided into four separate sessions of two days each. The popularity and demand for this instruction can be gauged from the fact that 62 applications were received for the six places which originally were made available.

Monthly lectures on beekeeping were also given by the Apiculturist to the final-year Chibero College students, two of whom have now entered the service of this Department.

All in-service instruction by the Apiculturist in beekeeping practice is given at the excellently equipped beehouse on Henderson Research Station and the formal courses for beginner beekeepers that have been mentioned are also being held there.

General

It is noteworthy that farmers in the Purchase Area and Tribal Trust Land have shown keen interest in various lines of small-stock production such as pigs, poultry, bees, fish farming and even rabbits. The fact that this interest has often been confined to very localized areas is probably due to the fact that they are very specialized lines of production, often requiring specialist advice.

Four very important considerations favour increased extension advice and production of these specialized small-stock lines:

(i) Many of these areas are fully stocked or overstocked with grazing animals, whereas there are few physical limitations to expansion of production from these small stock enterprises.

(ii) The African farmer very readily accepts and implements advice on these enterprises which are compartively new to him, and there are no barriers of tradition and custom.

(iii) In addition to the possibility of moving fairly rapidly into a cash economy with small initial capital requirements through production of these lines, most of them can provide sources of much-needed animal protein in more convenient quantities for home consumption than is the case with large stock.

(iv) Production of these lines does not suffer from the disadvantages inherent in a communal system of land tenure. The other major class of small stock, sheep production, appears to be developing most in the hands of a relatively small number of larger flock owners who, if this progress is to be maintained, will require more specialized and concentrated advice in future. The greatest short-term prospects for increased beef production lies in the European farming areas, and this important industry is at present in a critical stage of its development where an increased tempo of advisory work is indicated.

Training Branch

Headquarters

The enthusiasm of the Department is well shown in the record of formal training (Appendix V and Appendix X, Table 8). It was reasonable to anticipate that in-service training would come to a standstill during the period of understandable disturbance that attended the dissolution of the Federation. This, however, was not the case and a full programme of training has been followed with a vigour that promises well for those employed in the new Department.

Apart from routine obligatory induction training it is interesting to note the strong support given to, and demand for, courses dealing with Burley tobacco, veld and pastures, horticulture, livestock, farm machinery and irrigation. Also, the record of courses emphasizes the increasing importance of management in agriculture, in the prominance given to training in farm management and work study. A course dealing with extension with tenant cultivators stimulated interest in this new field.

Beekeeping courses are in a series of training sessions that take place at significant times of the year, and, being of a very practical character, can only accommodate small numbers of trainees. Nonetheless the high quality of this training has had a marked positive influence and beekeeping, particularly in African areas, has taken a big step forward in consequence.

The Training Branch has been formed from two components which distinguished themselves by the high quality of training each provided in its own area of operation, and it is noteworthy that more than 18 per cent. of those who attended the courses organized at headquarters were from other departments, countries, commerce and industry. Such extra-departmental requests to participate in Conex courses are increasing in number and it is gratifying that the standard of our training has gained such good report.

In particular, the needs of specialist officers to learn the essentials of training methods and techniques, have been recognized and this has brought requests for not only participation in courses already arranged and dealing with this subject, but full enrolments from specialist departments, eager to take advantage of the service headquarters training staff can offer in this connexion. These requests are encouraging and the branch is anxious to give its services to the greatest possible number, but it is thinly staffed to serve Conex alone, without taking into account the very necessary "training for trainers" of related departments and agencies which is now being called for. Headquarters, being the home of many specialists, must equip itself to provide an efficient and dynamic methods training service to ensure that the true principles of extension are applied in our work and that of associated organizations, so that there is clear and profitable communication between specialists, field workers and farmers.

To span the wide range of conditions for which training must be given the new Training Branch might be compared to an imaginery educational establishment which must at once cater for kindergarten and post-graduate students. A good start has been made. All major

responsibilities have been met and unification achieved, in spite of the loss of members of staff who had valuable experience in training.

Institute Programmes

Alvord

This institute has had a year of full training activity. Thirty-one courses were held at Alvord or elsewhere, under its sponsorship. There have been 640 full-time participants attending training, including six from the Bechuanaland Protectorate and six from Zambia.

Some dormitory accommodation has been condemned and is being replaced.

Msengezi

In addition to the adverse effect of the uncertainties surrounding this training venue the instructor has been on long leave and only a modest programme fulfilled. Fourteen courses have been held at the institute or in association with it. The Msengezi Experimental Farm and Artificial Insemination Centre are closed down and, alone, the training establishment becomes less viable. Currently investigation is being made into the possibility of transferring the Msengezi commitments elsewhere.

Kayisa

The resignation of the resident instructor has resulted in a reduced programme. Up to now this institute has been very active, and although only five courses are recorded for the period under review, apart from the three-month induction training, a two-month course on literacy and farming was arranged in conjunction with the Young Women's Christian Association of Mpopoma, Bulawayo, and attended by 10 Batonka tribesmen from Binga.

This course was of considerable significance in that it initiated training in a developing area of great importance, was a co-operative exercise with another agency, and dealt with people for whom education and basic agriculture are of particular importance. Their appreciation of this exercise made it most worthwhile.

Library

The proposal to establish a central library to serve all departments of Agriculture has made it difficult to plan the future of the Conex library.

The premises allocated to the library are at once inadequate and uncongenial, but with better premises available an improved library will soon be serving the Department.

Publications

The rule which requires departments to do their publishing through the medium of the Printing and Stationery Department greatly restricts activity under this heading. The need for timely and opportune publication is long accepted as a principle of applied extension. However, those publications produced within Conex, principally for staff, as advisory notes, have been published in satisfactory numbers and heavy demands for reprints of previous issues have been met.

There has been full participation on the Ministry's News Coverage Committee.

General

Training Branch at headquarters are concerned with the major part of the arrangements necessary when members of staff go on trips overseas. This work is very time consuming and it must be recorded that 20 overseas trips have been arranged through Training Branch this year.

By the same token senior staff recruits are received into the Department via the Training Branch. In the period under review 30 recruits have been dealt with by the branch.

The branch is also currently host to the visiting F.A.O. Extension Adviser and collaborates in the processing of his work and co-ordinates and submits most of the department's applications for external aid.

Youth Extension

The section conducted courses for staff of all provinces and for school teachers to stimulate interest in youth work, particularly Young Farmers' clubs. A more comprehensive programme in this same respect is planned for next year.

The number of Young Farmers' clubs remains substantially the same. New clubs formed balance some that have closed down and in many cases such closures were a consequence of staff leaving the Department of Education after the break-up of the Federation.

Clubs presently operating are:

	European	*Coloured*	*African*
Mashonaland	12	1	26
Manicaland	7	1	7
Midlands	8	—	3
Matabeleland	6	—	6
	33	2	42

The work of the section has been hampered by the overall staff shortage within the Training Branch, whose general work has had to be distributed over all available officers.

The section has enjoyed particularly close and fruitful liaison with the Natural Resources Board, whose support is gratefully acknowledged.

Extension Research

General

The principal policy aim is the building up of an information-gathering machine to supply information to assist in the planning and implementation of extension policy.

During the period under review little could be done in the way of systematic implementation of policy. Lack of staff made it impossible for the section itself to gather the data needed on a sufficiently widespread scale. Extension staff, another potential source of the required information, were too preoccupied with other matters, including the considerable degree of administrative reorganization resulting from the merger, to undertake this task, nor has extension programme planning, with clearly defined objectives, yet been implemented to any appreciable extent; so ruling out any possibility of a systematic evaluation of the effects of these programmes.

As a result, extension research has had to be conducted on an *ad hoc* or project basis. Various suggestions for the reorganization of the section to meet the needs of the current situation have been submitted.

Conferences and Courses Attended

The Extension Research Officer attended the following courses:

(i) A community development course of four weeks' duration.

(ii) An experimental intensive Shona language course of three weeks' duration.

Various conferences and seminars were attended by the Extension Research Officer, including the Departmental Training Branch Conference, a seminar of the Rhodesian Economic Society, and several field workers' seminars organized by the Department of African Studies of the University College of Rhodesia and Nyasaland.

Lectures were given to students at Chibero Training College and to mobile cinema unit operators of the Ministry of Information.

Field Studies and Data

Short field studies were conducted in the Fingo Location, Bubi District, Selukwe Tribal Trust Land and Nyahunda Purchase Area.

A paper was submitted outlining a possible technique for the collection and processing of data relating to extension activities in the Purchase Area.

Pilot experiments in data collection have been initiated in various parts of the country; and a number of different types of forms have been designed for this purpose. An experiment is also planned to discover whether an electronic computer can be used successfully for the actual processing of data of this nature.

Visitors

Visitors to the section included Professor J. F. Holleman, of the University of Leiden; Professor V. W. Turner, chairman of the African Studies Committee of Cornell University;

Dr. M. McArthur, F.A.O. Nutritional Consultant; and Dr. D. A. C. Catt, Agricultural Economist to the Malawi Government.

Land Tenure Advisory Service

During the year under review a post of land tenure officer was established to investigate existing land tenure systems and to examine systems elsewhere with the ultimate object of developing sound and practical procedures for this country. The Land Tenure Officer has to advise the department in all matters concerning the subject and the department in turn advises other ministries and especially the Rural Land Board.

Advice to the Public

This service has not been developed to any extent as yet due to the need to obtain a good working knowledge of the present position. But nevertheless the service has grown to about 20 direct inquiries a month. A good and friendly contact has been established with the local legal concerns and the estate agents.

All agents, boards of executors, trustees, etc., handling the sale or lease of farms have been invited to submit the names of farms coming on to their books—a service long required.

Special Schemes

A number of special schemes have been worked upon, in conjunction with other departments, such as the Eastern Districts Coffee Scheme, various irrigation and resettlement schemes.

ADVISORY SERVICES

Farm Visits

The demand for advisory services from all sectors of the farming community has been maintained at a high level, and in spite of staff shortages and disruption brought about by the dissolution of the Federation we were able to satisfy the demand to the general satisfaction of the farming public.

This is further evidenced by the fact that there is an increasing demand by the farmers for the personal attention of extension officers in planning and advice in respect of their farming enterprises, despite the services rendered to farmers by commercial concerns. It is gratifying to report that the standard of service rendered by Conex, so well established over the years, is maintained and improved by continuous training of staff and the support of extension specialists in many fields. We have the full confidence of the farming community and we accept the responsibility of providing our farmers with the best advice and assistance possible in the country.

Some 52,380 hours have been recorded in time spent visiting farms on general advisory work and on conservation work and layouts which accounted for more than 58.76 per. cent. of the time spent on farms. (See Appendix XI.)

Generally in tribal areas work has been conducted through interest groups and training centres and in spite of political pressure interested farmers have continued to attend. Subjects covered the complete range of crop and animal production and in most areas where politics has not been a serious factor the attitudes of farmers to the extension staff has taken a turn for the better. Extension has been concentrated through demonstration plots in which the benefits from the use of fertilizers, increased plant populations and improved seed were demonstrated. Animal husbandry extension has been concentrated on feeding, dosing, inoculation and herd selection.

On the African irrigation schemes extension work has been most successful because of close contact with farmers, the use of profitable crops and new techniques, and particularly the use of crops not bedevilled by traditional methods and influences.

Officers continued to take advantage of the in-service training courses available and attended those they felt could be of greatest use to them. (See list in appendices attached to this report.)

African staff are not strong technically and need much training in practical programming. The training is done informally in the field by both group conservation and extension officers and extension officers. (See Appendix X, Tables 1, 4 and 7.)

Farmers' Days and Discussion Groups

During the year field days and discussion groups were held which were attended by some 4,009 farmers.

In conjunction with farm visits, mass media contact through field days and discussion groups continued to play an important role as a method of disseminating information, raising interest and creating awareness.

The tendency has been for large-group fields days to be replaced in many areas by smaller, more intimate discussions and field afternoons.

EXPERIMENTAL FARMS

With the advent of a unified department the two experimental farms at Karoi and Chipinga had to be closed due to financial stringency during the year.

The experimental farms under the old Southern Rhodesia department, with the exception of two, all transferred to the Department of Research and Specialist Services. The two which were closed down completely were the Mrewa Breeding Station and the Msengezi Experimental Husbandry Station.

CONCLUSION

The implementation of Government policy for the development of the agricultural industry, which is of such vital importance to the future of the country, rests in a large measure with the Department of Conservation and Extension. This callenge has been accepted and the signs of progress are in evidence in many areas.

Much remans to be done, however, with particular reference to the uplift of the subsistence sector of the industry, and it is absolutely essential that a strong, efficient and enthusiastic extension service be established and maintained. In this connexion it is apparent that the fundamental and critical role of the extension service in the scheme of things is not always appreciated in certain quarters. That this is so is to be deplored, and irrecoverable ground may well be lost in consequence.

I would like to record my appreciation for the co-operation that this Department has had from the individual intensive conservation area commitees, the group committees and the Natural Resources Board in what has been a most difficult transitional period in the early life of our new organization.

Similarly, the assistance received from the Rhodesia National Farmers' Union, the African Farmers' Union, the farmers' associations, the Rhodesia Tobacco Association, the Tobacco Research Board, the Rural Land Board and numerous other bodies and organizations has greatly helped us and, for this, I am most grateful.

Finally, to my own staff, I express my particular appreciation for the way they have assisted in the difficult processes of establishing and strengthening our new Department of Conservation and Extension.

J. J. DUVENAGE,
Director of Conservation and Extension.

VISITS TO OTHER COUNTRIES

1. The Group Conservation Officer, Gwanda, Mr. J. M. B. Smith, returned in September, 1963, from an F.A.O.-sponsored study tour of the U.S.A. For four months Mr. Smith studied extension methods, beef cattle, range utilization, land usage, moisture conservation and irrigation techniques.

2. Mr. Witness Mbayiwa, extension assistant on the training staff at Kayisa Institute, Ntabazinduna, returned in September, 1964, from a 10-month course at the Merrist Wood Farm Institute, Surrey. This study was sponsored by the Nuffield Foundation.

3. Assistant extension officer Machiri and supervisor Kondo, who are both stationed in the Manicaland Province, visited Formosa, and for nine months participated in a course for training African technicians in agricultural techniques. These two scholarships were given by the Republic of China.

4. The Director, Mr. J. J. Duvenage, accompanied by the extension instructor, Alvord Institute, Mr. G. A. Smith, visited Italy for one week, in April. Arranged by the United Kingdom Committee of the Freedom From Hunger Campaign, the trip was concerned with an evaluation of the Borgo a Mozzano experiment in extension as a training situation for Rhodesian officers concerned with extension.

5. In June the Director, Mr. J. J. Duvenage, and the Provincial Conservation and Extension Officer, Victoria, attended the ninth conference of S.A.R.C.C.U.S., held in South Africa.

In July the Director visited South African universities and agricultural colleges to recruit staff for service in the Ministry of Agriculture.

6. Mr. N. O'Connell of the Farm Management Section visited the United Kingdom, Denmark, West Germany and United States, on a scholarship provided by F.A.O., and, for four months studied farm management recording, from July to October.

7. Mr. M. Keech, Group Officer, Umvukwes, briefly studied farm management in the United Kingdom.

8. Mr. B. D. Elkington, Chief Training Officer, has visited Greece, Italy and U.S.A., on a four-month study tour sponsored by F.A.O. The tour was mainly concerned with in-service and supervisory training, youth extension, evaluation techniques and communication (July to November).

9. Mr. J. Dowa, extension assistant on the training staff of Alvord Institute, has attended a five-month course on rural development, as a guest of the Danish Government, at Holte College, near Copenhagen. During the course participants visited Sweden, Switzerland and Greece.

10. Chief Agronomy Extension Officer, Mr. J. C. Harper, visited Ethiopia to attend the third F.A.O. regional conference for Africa, which was held in September at Addis Ababa.

11. In September, Mr. J. Mfiri, extension assistant at Essexvale, Matabeleland, left to take up a Nuffield Foundation Scholarship in England. Mr. Mfiri will study at the Merrist Wood Farm Institute, Surrey, for 10 months.

LIST OF COMMITTEES OR BOARDS ON WHICH SENIOR OFFICERS SERVED

The Directorate, or their representatives, served on the following committees or boards:

Conservation Education Committee of the Natural Resources Board.
Water Resources Committee of the Natural Resources Board.
General Purposes Committee of the Natural Resources Board.
Natural Resources Board.
Tribal Trust Land Committee of the Natural Resources Board.
Young Farmers' Club Council.
Young Farmers' Club Executive.

Gwebi College Council.
Chibero Agricultural College Council.
Interim Fibre Committee.
Weed Control Committee.
Technical Committee on Fertilizer.
Henderson Research Station Farm Unit Committee.
Agricultural Production Committee (Main).
Agricultural Production Executive Committee.
A.P.C. Grains Subcommittee (Chairman).
A.P.C. Lands Subcommittee.
A.P.C. Cattle Committee.
Tsetse Areas Co-ordinating Committee.
Fibre Production Committee.
Southern Rhodesia Research Advisory Committee.
Chiredzi Research Advisory Committee.
Hydrological Co-ordinating Committee.
Rhodesia Cotton Growers' Association.
Pasture Seeds and Horticultural Crops Committee.
Seed Production Council.
R.N.F.U. Farm Management Committee.
Standing Committee on Agricultural Mechanization.
Sabi Development Farm Committee (Chairman).
Ministry Show Committee (Chairman).
Sabi Technical Advisory Committee.
Field Experiment Committee (Chairman).
Work Planning Committee.
Farm Buildings Advisory Committee (Chairman).
Livestock Improvement Committee (Chairman).
Southern African Regional Committee for the Conservation and Utilization of the Soil.
Mashona Cattle Society.
Tuli Cattle Society.
Tobacco Research Board.
Rural Land Board.
Rural Land Board Subdivision Committee.
Rural Land Board Finance Committee.
Rural Land Board Subcommittee on Land Settlement.
Bothashof School Council.
Artificial Insemination Committee.
Freedom From Hunger Campaign National Committee.
Freedom From Hunger Campaign Projects Subcommittee.
Tribal Trust Land Planning Committee.
News Dissemination Committee.
Water and Land Development Subcommittee of Sabi-Lundi Authority.
Wild Life Conservation Committee of the Natural Resources Board.
African Loan Fund Committee.
Farm Buildings Advisory Committee.
African Farmers' Liaison Committee with the Ministry.

PUBLICATIONS

Title	*Author*	*Publication*
Weekly Tobacco Bulletin	Tobacco Branch	*Rhodesian Farmer*
Breakdown of Quality Factors — I	R. Hope	*Tobacco Forum*
II	R. Hope	*Tobacco Forum*
III	J. Hayward	*Tobacco Forum*
IV	J. Hayward	*Tobacco Forum*
Preparation of Burley for Sale	J. Hayward	*Tobacco Forum*
Aromatic Growing Practices	G. Westbury	*Tobacco Forum*
Check Equipment for Planting Tobacco	G. Milligan	*Modern Farming*
Burley Land Preparation and Cultural Practices	G. Milligan	*Modern Farming*
Some Engineering Aspects of Air Photo-Interpretation, Catchment Development Programmes	R. G .B. Jones	*The Photogrammetric Record*
Some Provisional Standards of Labour and Tractor Use in Crop Production	G. Thorpe and N. O'Connell	*Rhodesia Agricultural Journal*
Handling Tobacco on Strings	B. Duncan	*Rhodesian Farmer*
Barn Loading	B. Duncan	*Rhodesia Tobacco Journal*
String Bulking	B. Duncan	*Rhodesia Tobacco Journal*
Work Study Staff Seeking to Reduce Handling Time for Flue-cured	B. Duncan	*Tobacco Forum*
Expert Analyses Symposiums, Nine Reaping Methods	B. Ducan	*Rhodesia Tobacco Journal*
Hang Under the Stick—or Without the Stick	B. Duncan	*Rhodesia Tobacco Journal*
Reducing the Labour Force	de Jong	*Rhodesian Farmer*
Work Study at Work on Stumping	de Jong	*Rhodesian Farmer*
Graphical Guide to Labour Requirements	Wilson and Kille	*Rhodesia Agricultural Journal*
Work Study Grading	Kille	*Rhodesia Agricultural Journal*

In addition to the above-mentioned items, other articles were written by members of staff and published in various newspapers and magazines or in the form of technical memoranda. The Public Relations Officer alone issued 354 general press releases and 54 special articles.

DETAILS REGARDING OPERATION OF LIVESTOCK IMPROVEMENT SCHEME

A. Purchase of Stock by the Committee on Behalf of Farmers

1. CATTLE

	1.10.63 to 30.9.64	*1.10.62 to 30.9.63*	*1.10.61 to 30.9.62*
Pedigree bulls	2 for £693	16 for £3,621	10 for £2,388
Pedigree females	—	—	—
Grade females	—	—	—
TOTALS	2 for £693	16 for £3,621	10 for £2,388

2. DETAILS OF BREEDS PURCHASED

Bulls	*1.10.63 to 30.9.64*	*1.10.62 to 30.9.63*	*1.10.61 to 30.9.62*
Africander	—	1 for £705	—
Aberdeen Angus	—	3 for £935	5 for £1,470
Friesland	2 for £693	1 for £350	—
Hereford	—	7 for £1,468	5 for £918
Sussex	—	—	—
TOTAL	2 for £693	16 for £3,614	10 for £2,388

Females	*1.10.63 to 30.9.64*	*1.10.62 to 30.9.63*	*1.10.61 to 30.9.62*
	—	—	—

3. SHEEP (RAMS AND EWES)

Rams	*1.10.63 to 30.9.64*	*1.10.62 to 30.9.63*	*1.10.61 to 30.9.62*
Dorper	51 for £780	57 for £980	13 for £232
German Merino	—	3 for £50	1 for £25
Suffolk	3 for £110	1 for £150	—
Southdown	1 for £50	1 for £50	—
Hampshire	1 for £30	1 for £30	—
TOTAL	56 for £970	62 for £1,160	14 for £257

Ewes	*1.10.63 to 30.9.64*	*1.10.62 to 30.9.63*	*1.10.61 to 30.9.62*
Dorper	122 for £935	121 for £795	—
German Merino	—	5 for £40	—
Southdown	1 for £20	1 for £25	—
TOTAL	123 for £955	127 for £860	—

B. Totals of Livestock Imported from the Republic of South Africa

1. CATTLE

Bulls	*1.10.63 to 30.9.64*	*1.10.62 to 30.9.63*	*1.10.61 to 30.9.62*
Ayrshire	—	—	1
Aberdeen Angus	2	6	8
Africander	4	46	97
Brown Swiss	—	3	—
Brahman	11	2	2
Charolais	—	1	—
Friesland	2	—	—
Guernsey	—	7	2
Hereford	6	25	60
Jersey	3	4	1
Lincoln Red	—	7	—
Red Poll	1	1	—
Shorthorn	2	3	4
Sussex	43	20	22
South Devon	4	4	—
Santa Gertrudus	—	7	—
TOTAL	68	136	197

Females	*1.10.63 to 30.9.64*	*1.10.62 to 30.9.63*	*1.10.61 to 30.9.62*
Africander	—	44	—
Aberdeen Angus	—	—	21
Brahman	—	—	2+2 calves
Dexter	—	—	6+2 calves
Friesland	—	4	9
Guernsey	—	—	2
Hereford	10	10	27+6 calves
Shorthorn	6	—	—
Sussex	32	—	34
TOTAL	48	58	111+10calves

2. SHEEP

Breed	*Rams*	*Ewes*
Corriedale	—	2
Dorper	52	277
Dorset Horn	4	—
Dormer	1	—
White Dorgian	1	—
German Merino	4	2
Hampshire	2	—
Persian	1	—
Suffolk	—	10
Southdown	1	—
Van Rooy	2	—
TOTAL	68	291

3. GOATS

Breed	*Rams*	*Ewes*
Angora	1	22
Boergoat	5	7
Toggenberg	1	—
TOTAL	7	29

4. PIGS

Breed	*Boars*	*Gilts/Sows*
Landrace	2	1
TOTAL	2	1

C. Livestock Imported from Overseas

1. CATTLE

UNITED KINGDOM	*1.10.63 to 30.9.64*		*1.10.62 to 30.9.63*		*1.10.61 to 30.9.62*	
	Bulls	*Females*	*Bulls*	*Females*	*Bulls*	*Females*
Aberdeen Angus	2	—	—	—	—	—
Ayrshire	4	—	5	—	—	—
Hereford	3	—	2	2	4	—
Friesland	—	—	1	—	2	—
Shorthorn	—	—	1	—	—	2
Jersey	—	—	—	—	2	—
TOTAL	9	—	9	2	8	2

HOLLAND	*1.10.63 to 30.9.64*		*1.10.62 to 30.9.63*		*1.10.61 to 30.9.62*	
	Bulls	*Females*	*Bulls*	*Females*	*Bulls*	*Females*
Friesland	1	—	3	15	—	—
TOTALS	1	—	3	15	—	—

UNITED STATES	*1.10.63 to 30.9.64*		*1.10.62 to 30.9.63*		*1.10.61 to 30.9.62*	
	Bulls	*Females*	*Bulls*	*Females*	*Bulls*	*Females*
Brahman	6	39	—	—	8	10
Brangus	1	—	—	—	2	3
TOTAL	7	39	—	—	10	23

	1.10.63 to 30.9.64		*1.10.62 to 30.9.63*		*1.10.61 to 30.9.62*	
	Bulls	*Females*	*Bulls*	*Females*	*Bulls*	*Females*
GRAND TOTAL	15	39	12	17	18	25

2. SHEEP

UNITED KINGDOM	*Males*	*Females*
Wiltshire Horn	1	—
TOTAL	1	—

3. PIGS

UNITED KINGDOM

Breed	*Male*	*Females*
Large White	5	3
Landrace	4	—
Welsh	3	8
TOTAL	12	11

SWEDEN

Breed	*Male*	*Females*
Landrace	1	—
TOTAL	1	—

APPENDIX IV *(continued)*

D. Livestock Imported from Other Countries

CATTLE

Breed	ZAMBIA *Males*	*Females*	*Other Calves*	MALAWI *Male*	*Females*	*Other Calves*
Angoni	—	50	—	—	—	—
Boran	—	6	—	—	—	—
Friesland	1	10	—	—	—	—
Hereford	—	—	—	25	—	—
Jersey	2	45	—	—	—	—
Other Beef Cattle	3	243	94	—	—	—
	—	—	—	—	—	—
TOTAL	6	354	94	25	—	—

APPENDIX V

RECORD OF FORMAL TRAINING SESSIONS ORGANIZED BY TRAINING BRANCH IN CO-OPERATION WITH SPECIALISTS

Dates *From*	*To*	*Nature of Course*	*Conex Officers*	*Participants* *Officers from Other Countries*	*Officers from Other Depts.*	*Commerce and Industry*
3.3.64	—	Burley Tobacco	22		1	
4.3.64	5.3.64	Beef Production (Enkeldoorn)	18		4	
9.3.64	18.3.64	Conservation, Course I (Mechanical).	15	2		
9.3.64	12.3.64	Farm Machinery (Ox)	10			3
18.3.64	—	Beef Production (Sby.)	15		3	
6.4.64	8.4.64	Public Speaking (Sby.)	7			5
9.4.64	10.4.64	Public Speaking (Sby.)			5	7
13.4.64	15.4.64	Public Speaking (Sby.)	9		2	
16.4.64	18.4.64	Public Speaking (Sby.)	3		9	
20.4.64	22.4.64	Public Speaking (Gwelo)	10		3	
21.4.64	23.4.64	Extension with Tenant Cultivators.	12		4	
23.4.64	25.4.64	Public Speaking (Byo.)	6			
28.4.64	1.5.64	Farm Management (Full Course)	14			
5.5.64	8.5.64	Farm Buildings	6	1		
12.5.64	13.5.64	Sheep Management	15		5	
12.5.64	13.5.64	Veld and Pastures	17		1	
14.5.64	15.5.64	Veld and Pastures	22			
14.5.64	15.5.64	Sheep Management	25			
19.5.64	22.5.64	Farm Management (Full Course, Sby.).	10		6	
26.5.64	5.6.64	Conservation, Course III (Farm Planning).	9	3		

Dates		*Nature of Course*	*Participants*			
From	*To*		*Conex Officers*	*Officers from Other Countries*	*Officers from Other Depts.*	*Commerce and Industry*
2.6.64	3.6.64	Beekeeping	8			
9.6.64	10.6.64	Work Study (Refresher) . .	4		3	4
11.6.64	12.6.64	Farm Management (Development).	10			
16.6.64	26.6.64	Conservation, Course III (Farm Planning) (Development).	15	1	4	
23.6.64	25.6.64	Management Training (P.S.B.) .	10			
29.6.64	30.6.64	Farm Management (Development) (Sby.).	11			
30.6.64	1.7.64	Beekeeping	7			
6.7.64	7.7.64	Farm Management (Development) (Byo.).	12		2	
10.7.64	—	Beef Production (Umtali) . .	24		1	
18.7.64	—	Beef Production (Byo.) . . .	14		6	
20.7.64	22.7.64	Farm Machinery (Tractor) . .	6			
21.7.64	24.7.64	Farm Management (Recording) (Full Course).	15	1		
22.7.64	24.7.64	Farm Machinery (Tractor) . .	5	3		
27.7.64	29.7.64	Farm Machinery (Tractor) . .	3		1	
27.7.64	31.7.64	Horticulture (Sby.)	10		3	
28.7.64	29.7.64	Work Study (Refresher) . .	1	1	6	
29.7.64	31.7.64	Farm Machinery (Tractor) . .	2			
3.8.64	7.8.64	Horticulture	20			
10.8.64	14.8.64	Farm Planning (External) . .			8	3
18.8.64	28.8.64	Irrigation (Full Course) . .	17		1	1
25.8.64	4.9.64	Farm Machinery (Ox and Tractor).	15			
1.9.64	4.9.64	Work Study (Full Course) . .	15	3		
15.9.64	18.9.64	Work Study (Repeat) . . .	8			
15.9.64	18.9.64	Burley Tobacco U.C.R.N. . .				36 farmers
22.9.64	24.9.64	Flue-cured Tobacco U.C.R.N. .				19 farmers
15.9.64	16.9.64	Beekeeping	8			
17.9.64	18.9.64	Beekeeping	7			
29.9.64	30.9.64	Beekeeping	30			

Total courses	48
Total attendance	694

LIST OF INTENSIVE CONSERVATION AREAS AND GROUPS

A. EUROPEAN FARMING AREAS

Province	*Group*	*I.C.A.*	*No. of Farmers*
Mashonaland North	Karoi	Karoi North	81
		Karoi Central	62
		Karoi South	64
		Tengwe	45
		Vuti	47
	Sinoia	Doma	83
		Angwa North	69
		Angwa South	93
	Banket	Ayrshire North	47
		Ayrshire South	46
		Eldorado–Banket	74
		Trelawney	83
		Darwendale	58
	Umvukwes	Horseshoe	52
		Centenary West	74
		Umvukwes	71
		Centenary East	37
	Mazoe	Barwick	67
		Marodzi–Tatagura	68
		Glendale	67
		Bindura	95
		Shamva	64
		Darwin	16
Mashonaland South	Umfuli	Umsweswe	120
		Suri Suri	93
		Gadzema	58
		Sokis	41
		Umfuli	37
		Selous	81
	Salisbury South	Norton	76
		Salisbury South	87
		Beatrice	102
	Salisbury	Gwebi–Hunyani	84
		Salisbury West	47
		Arcturus	118
		Ruwa	81
	Marandellas	Marandellas North	74
		Marandellas West	55
		Wedza North	58
		Wedza South	48
		Wenimbi	76
		Bromley	110
	Macheke	Macheke	94
		Nyandora	102
		Mtoko	91
Manicaland	Headlands	Headlands	58
		Mayo	47
		Chinyika	41

APPENDIX VI *(continued)*

Province	*Group*	*I.C.A.*	*No. of Farmers*
	Rusape	Odzi	75
		Tsungwesi	84
		Rusape	91
	Eastern	Inyanga	81
		Umtali North	113
		Umtali South	92
		Cashel	50
		Melsetter	44
		Chipinga	98
Midlands	Gwelo–Que Que	Battlefields	36
		Sessombe	41
		Umniati–Sebakwe	28
		Bembezaan	67
		Gwelo	96
		Gwelo East	114
		Vungu	42
		Ingezi	68
	Tokwe–Belingwe	Tokwe	53
		Selukwe	89
		Belingwe–Shabani	41
	Charter	Featherstone	98
		Umvuma	72
		Enkeldoorn	60
Victoria	Victoria Highveld	Gutu	54
		Chatsworth	39
		Victoria Central	77
		Victoria East	48
		Umshandige	27
		Sabi Valley	6
	Victoria Lowveld	Nuanetsi	64
		Chiredzi	27
Matabeleland	Matetsi–Umgusa	Matetsi	22
		Gwaai	18
		Lower Umgusa	45
		Bubi	35
		Inyati	53
	Shangani–Filabusi	Lower Khami	44
		Upper Umgusa	134
		Insiza River	39
		Mchingwe	52
		Essexvale	74
		Filabusi	38
		Shangani	33
	Marula–Gwanda	Upper Khami	50
		Plumtree	33
		Figtree	73
		Marula	38
		Matopos North	28

Province	*Group*	*I.C.A.*	*No. of Farmers*
Matabeleland	Marula-Gwanda	Matopos South	44
		Gwanda	40
		Limpopo	28

Number of Intensive Conservation Areas is 99.
Total number of farmers is 6,288.

B. AFRICAN PURCHASE AREAS

1. PURCHASE AREA GROUPS OF I.C.As.

Group	*Secretary*
Central Mashonaland Group:	
Marirangwe, Muda, Chimbghanda and Chitowa I.C.As.	Mr. Chipunza, P.O. Box 1138, Salisbury.
Dewure–Nywzwidzi–Mazari Group:	
3 Dewure I.C.As., 3 Nyazwidzi I.C.As. and Mazari I.C.A.	Mr. M. K. Mojapelo, P. Bag 910, Gutu.
Lomagundi Group:	
Nyakapupu I.C.A., 3 Chitomborgwizi I.C.As. and 3 Zowa I.C.As.	Mr. Reggie, c/o Lionridge Store, Gadzema.
Manicaland:	
Chinyauwhera I.C.A. and Tsonzo I.C.A., 2 Rowa I.C.As. and 2 Mukuni I.C.As.	Mr. I. E. Mwedzi, P. Bag 13, Odzi.
Mshawasha Group:	
4 Mshawasha I.C.As.	Mr. S. Mashiringi, Mandini School, P.O. Box 430, Fort Victoria.
Ziyambe Group:	
5 Ziyambe I.C.As.	Mr. F. M. Guwa, Ziyambe School, P. Bag 22, Wedza.

Committee	*Secretary*
Chenjiri Central I.C.A.	Mr. J. B. Mswela, P. Bag 35, Gatooma.
Chenjiri East I.C.A.	Mr. P. P. Rutumo, P. Bag 35, Gatooma.
Chenjiri West I.C.A.	Mr. J. B. Mswela, P. Bag 35, Gatooma.
Chesa Mutondwe I.C.A.	Mr. H. M. Ziyambi, P.O. Box 38, Mt. Pleasant.
Chesa North I.C.A.	Mr. Maswena, c/o Chironga Mission, P. Bag 2, Mt. Darwin.
Chesa Nyanjenje I.C.A.	Mr. S. Mandundu, P.O. Box 36, Mt. Darwin.
Chesa South I.C.A.	Mr. P. Manyani, Nyakasikang Store, P.O. Box 14, Mt. Darwin.
Chimbghanda I.C.A.	Mr. A. M. Nyamande, P. Bag 764, Marandellas.
Chinyauwhere I.C.A.	Mr. G. Rakabopa, c/o Ngaite Store, P. Bag 7377, Umtali.
Chitomborgwezi East I.C.A.	Mr. Savanhu, P.O. Box 530, Sinoia.
Chitomborgwezi West I.C.A.	Mr. C. Cyrus, P.O. Box 190, Sinoia.
Chitomborgwezi Central I.C.A.	Mr. Oliver, P.O. Box 635, Sinoia.
Chitowa I.C.A.	Mr. Godobo, P. Bag 14, Mrewa.

Committee	*Secretary*
Copper Queen I.C.A.	
Dewure Central I.C.A.	Mr. M. K. Mojapelo, P. Bag 910, Gutu.
Dewure East I.C.A.	Mr. J. D. Masoha, P. Bag 912, Gutu.
Dewure West I.C.A.	Mr. K. K. Shabi, P.O. Box 57, Gutu.
Godhlawayo I.C.A.	Mr. J. M. Ndlovu, P. Bag 2, Filabusi.
Gokomera I.C.A.	Mr. N. Mapute, Gokomera African Council, P.O. Box 965, Gwelo.
Gwaai–Insuza I.C.A.	Mr. P. Malandu, Gwaai Division, P.O. Lupani.
Jenya I.C.A.	Mr. T. Mutabeni, P.O. Box 28, Mashaba.
Karuyana I.C.A.	Mr. J. B. Siwela, P.O. Box 24, Mt. Darwin.
Lupanda–Sipopoma I.C.A.	Mr. G. P. Siqalaba, Farm 124, Gwaai Division, P.O. Lupani.
Marirangwe I.C.A.	Mr. M. Madzimbimato, P.O. Box 1138, Salisbury.
Maronda–Mashanu I.C.A.	Mr. Mamvura, P.O. Box 76, Enkeldoorn.
Mazari I.C.A.	Mr. Seka, c/o Shikwanda Mission, P. Bag 3, Gutu.
Msengezi Agricultural Committee	Mr. L. T. Nkola, P.O. Msengezi, via Hartley.
Msengezi Central I.C.A.	
Mshagashe East I.C.A.	Mr. E. Muzira, c/o Mr. Oliver, P.O. Box 354, Fort Victoria.
Mshagashe West I.C.A.	Mr. R. Mlalazi, P.O. Chatsworth.
Mshawasha Central I.C.A.	Mr. J. R. Gavure, P.O. Box 319, Fort Victoria.
Mshawasha East I.C.A.	Mr. S. D. Mahuni, Muchibwa School, P. Bag 9095, Fort Victoria.
Mshawasha Mandini I.C.A.	Mr. A. Msoto, P.O. Box 430, Fort Victoria.
Mshawasha West I.C.A.	Mr. M. C. Munodawafa, c/o Mamvura School, P. Bag 9150, Fort Victoria.
Mtoro I.C.A.	Mr. L. Bepura, Mtoro School, P. Bag 13, Enkeldoorn.
Muda I.C.A.	Mr. Mzambga, P. Bag 20R, Harare.
Mukuni North I.C.A.	Mr. J. Muzhizhizhi, P. Bag 13, Odzi.
Mukuni South	Mr. I. E. Mwedzi, P. Bag 13, Odzi.
Mungesi I.C.A.	Mr. M. Kanjanga, c/o Glen Clova Store, P.O. Glen Clova, Fort Victoria.
Nyahunda East I.C.A.	Mr. J. Mariga, c/o Checheni Store, P. Bag 4B, Bikita.
Nyahunda West I.C.A.	Mr. F. S. Dzukuso, P. Bag 4B, Bikita.
Nykapupu I.C.A.	Mr. Mufanebadza, c/o St. Edwards School, Nyakapupu N.P.A., P.O. Sipolilo.
Nyazwidzi East I.C.A.	Mr. E. Muwungani, Foto Township, P.O. Box 48, Gutu.
Nyazwidzi North I.C.A.	Mr. J. Magadora, Gonese School, P.O. Box 51, Gutu.
Nyazwidzi South I.C.A.	Mr. J. M. C. Chihambakwe, P.O. Box 51, Gutu.
Rowa East I.C.A.	Mr. H. Nyamhondera, P.O. Box 3034, Sakubva, Umtali.
Rowa West I.C.A.	Mr. B. Musamirapamwe, Gwese School, P. Bag C.7309, Umtali.
Shangure I.C.A.	
Silobela Agricultural Committee	Mr. Gwebu, P. Bag 36, Gwelo.

APPENDIX VI *(continued)*

Committee	*Secretary*
Tsonzo I.C.A.	Mr. O. Madziro, P.O. Watsomba.
Vungu Division I.C.A.	Mr. Ngwenya, Vungu Council School, P.O. Lower Gwelo.
Zinyama I.C.A.	Mr. J. B. Dube, Sangulube School, P.O. Box 63, Plumtree.
Ziyambe East I.C.A.	Mr. F. M. Guwa, Ziyambe School, P. Bag 2, Wedza.
Ziyambe North I.C.A.	Mr. A. Shumba, Ziyambe School, P. Bag 2, Wedza.
Ziyambe Sabi I.C.A.	Mr. G. Muhwati, P.O. Box 1, Wedza.
Ziyambe South I.C.A.	Mr. R. T. Dune, P. Bag 2, Wedza.
Ziyambe West I.C.A.	Mr. Manyere, St. Roberts School, P. Bag 2, Wedza.
Zinyaningwe East I.C.A.	Mr. C. M. Mbanga, P.O. Box 24, Mashaba.
Zinyaningwe West	
Zowa East I.C.A.	Mr. L. Munyari, P. Bag 22, Hartley.
Zowa North I.C.A.	Mr. M. Gombera, c/o Baramasimbe School, P. Bag 22, Hartley.
Zowa South I.C.A.	Mr. P. Manizha, c/o Zingwe School, P. Bag 22, Hartley.

APPENDIX VII

CONTOUR RIDGES/STORM DRAINS AND OTHER WORK

Province	*Period*	*Contour Ridges and Storm Drains (miles)*	*Waterway (miles)*	*Roads Pegged (miles)*	*Bush Clearing (acres)*
Mashonaland South	1963–64	1,499·8	13·5	77·7	—
Mashonaland North	1963–64	4,632·5	32·4	226·4	1,054·4
Midlands	1963–64	413·4	33·9	151·7	1,060·0
Matabeleland	1963–64	333·5	10·5	13·4	—
Manicaland	1963–64	1,094·1	7·0	49·8	—
Victoria	1963–64	803·9	7·5	4·5	85·0
TOTAL		8,777	105	524	2,199

APPENDIX VIII

WATER CONSERVATION STATISTICS

Province	*Period*	*No. of Dams*	*Aggregate Capacity (in gals.)*	*Average Capacity per Dam (in gals.)*
Mashonaland South	1963–64	19	57,350,000	3,018,000
Mashonaland North	1963–64	83	607,750,000	7,412,000
Midlands	1963–64	60	165,500,000	2,758,000
Matabeleland	1963–64	69	448,850,000	6,505,000
Manicaland	1963–64	37	68,610,000	1,854,000
Victoria	1963–64	48	69,650,000	1,451,000
TOTAL		316	1,417,710,000	4,486,000

APPENDIX VIII (*continued*)

BY WHOM DAMS WERE CONSTRUCTED

Year	*Farmers and Contractors*		*Government Units*		*Weirs*		*Total*
	No.	%	*No.*	%	*No.*	%	
1963–64 . . .	184	58·2	110	34·8	22	7·0	316

APPENDIX IX

LIST OF FIELD TRIALS CARRIED OUT BY THE DEPARTMENT OF CONSERVATION AND EXTENSION IN 1963-64

Type	*Mashonaland North*	*Mashonaland South*	*Manica-Land*	*Midlands*	*Matabeleland*	*Victoria*	*Total*
Groundnuts	3	2	1	—	1	—	7
Cotton	7	3	1	—	1	1	13
Maize	5	1	1	1	—	1	9
Sorghum	2	1	1	—	2	2	8
Soya beans	2	3	1	1	—	1	8
Wheat	1	1	1	1	—	1	5
Edible beans	2	—	—	—	—	—	2
Sunflower	—	—	—	—	2	—	2
Castor beans	—	—	—	—	—	1	1
Maize—streak control	—	—	—	—	2	—	2
Banana	—	—	1	—	—	—	1
Liming trials	2	5	2	—	—	1	10
Drainage trials	—	7	2	—	—	—	9
Veld management and livestock . .	—	—	—	—	6	—	6
Virginia tobacco liming trials . .	—	2	—	—	—	—	2
Burley tobacco N.P.K. trials . . .	1	1	5	—	—	1	8
Spacing and nitrogen trials . . .	2	—	—	—	—	—	2
Turkish tobacco—							
Date of planting	—	1	—	—	3	—	4
Rates of N.P.K.	—	—	—	—	1	—	1
Density of stringing	—	—	—	—	2	—	2
Fumigation and rates of nitrogen .	—	—	—	—	1	—	1
Soil fumigation observation . .	—	—	—	—	1	—	1
Fodder crops	5	2	—	—	—	—	7
Sunflower	1	1	—	—	—	—	2
Veld management and pasture . .	—	—	1	—	—	—	1
Bush and weed control	3	—	5	1	2	—	11
Sisal	—	—	5	1	—	—	6
Kenaf	1	—	—	—	—	1	2
Peach management	—	—	2	—	—	—	2
Wheat	—	—	5	—	2	—	7
Livestock	—	—	—	—	3	—	3
Sundry and other demonstrations and observation trials	1	—	5	1	9	—	16
	—	—	—	—	—	—	—
TOTAL	38	30	39	6	38	10	161

SPECIAL STATISTICS FOR AFRICAN AREAS (TABLES 1 TO 9)

TABLE 1.—AGRICULTURAL DEMONSTRATION WORK

Province	*Demonstration Centres: Number*	*Number of Plotholders*	*Acres Planted*
Mashonaland North	130	1,180	260
Mashonaland South	83	1,479	9,366
Matabeleland	98	1,375	6,379
Victoria	147	3,387	23,858
Midlands	179	1,171	3,990
Manicaland	94	2,855	6,646
TOTAL	731	11,447	50,499

Demonstration centres are centres where one extension assistant is conducting demonstration work with plotholders, who may number up to 16 at each centre.

TABLE 2.—CROPS GROWN ON DEMONSTRATION PLOTS

Crops Grown	*Acres*	*Total Yield (bags)*	*Average Yield (bags/acre)*	*Best Yield (bags/acre)*
Maize	12,678	67,332	5·31	32
Groundnuts	8,500	32,708	3·85	16
Finger millet (Rapoko)	6,806	17,009	2·50	12·5
Sorghums	1,630	3,326	2·04	22
Bullrush millet (munga)	4,325	13,080	3·02	12
Cotton (lb.)	47	51,375 lb.	1,093 lb./acre	2,292 lb./acre
Beans	210	229	1·61	4·5
Sunnhemp	6	10	1·67	4
Wheat	102	141	1·38	5
Bambarra nut (nyimo)	1,127	2,476	2·20	8·5
Cowpeas	213	427	2·00	7
Paddy rice	177	247	1·40	4
Soya beans	103	266	2·58	6
Sunflower	3	8	2·67	5
Sweet potato	50	1,003	20·06	30
Irish potato	5	155	31·00	54
Velvet beans	8	27	3·38	4
Peas	10	80	8·00	10
Tomatoes (£)	16	£800	£50·00	£100
TOTAL	36,016	138,634	3·85	32M.

Note.—All crops measures in terms of bags of 200 lb. net. other than shelled nuts (180 lb. net), sunflower (125 lb. net), rice unhusked (50 lb. net), Irish potatoes (150 lb. net), and tomatoes (£ s. d.).

TABLE 3.—CROP HUSBANDRY EXTENSION

	Seed Distributed (200 lb. bags)				Seed Treatment (wt. treated lb.)		Fertilizer Distributed (tons)				
	Hybrid Maize	Open Pollinated Maize	Groundnuts	Other	Groundnuts	Other Specify	"P"	"D"	Urea	CAN	Other
Matabeleland	—	3	3	85 lb. cow peas 90 lb. velvet beans 230 lb. feterita, 11/56	—	—	¼	2¼	—	¾	—
Victoria	17¼	5½	3	75 lb. cotton 4 bags sorghum	120	—	10¾	5	—	8¾	Supers 2½ Lime 37¼ Gypsum ¼
Mashonaland South	9½	—	8	2·4 cotton 2·5 soya bean	1,420	Inoculated soya bean 420	—	5½	—	5	Gypsum 1 Supers ½
Manicaland	111	3	31¼	3 sorghum 1 sunflower	400	—	7¾	9½	—	8	Gypsum 9¼ Lime 29 S/A 2 "C" 3½
Midlands	2½	17	9½	3¼ sorghum 1 millet ¼ soya bean 20 lb. cow peas 80 lb. dahl	—	—	—	—	—	—	—
Mashonaland North	NOT APPLICABLE										

TABLE 4.—RECORD OF GENERAL EXTENSION WORK

Province	Mashonaland North	Mashonaland South	Matabeleland	Midlands	Victoria	Manicaland	Total
1. Number of plotholders	1,180	1,479	1,380	1,173	3,387	2,855	11,454
2. Number of master farmers	1,442	3,095	585	1,629	5,879	1,142	13,772
3. Number of co-operators	2,849	24,349	7,596	13,362	29,673	19,962	97,791
4. Total no. of cultivators	49,250	81,892	69,558	76,928	89,000	74,882	441,510
5. Estimated no. of farm carts in use	5,470	8,098	4,855	6,474	8,428	6,627	39,952
6. No. of farmers using fertilizer	1,803	2,892	480	1,067	5,384	2,572	14,198
7. Number of farmers' days	116	126	116	184	195	725	1,462
8. Number of agricultural shows	2	1	3	7	21	1	35

Plotholder: A farmer who is under tuition by an extension assistant in order to become a master farmer, and whose cropping programme is recorded.
Master Farmer: One who holds a Master Farmer's Certificate/Co-operator.
Any farmer who uses manure and fertilizer, carries out some crop rotation and plants his crops in rows (other than broadcast cover crops).

TABLE 5.—ANIMAL HUSBANDRY EXTENSION

Province	No. of Bulls Selected		Bulls from Breeding Station		Supplementary Feeding		Vlei Improvement		Dosing (No. Dosed)	
	Year	Total	Sold	Loaned	No. Making Silage	No. Making Hay	Year Acres	Total Acres	Sheep	Cattle
Mashonaland North	—	—	—	—	92	214	—	81	—	88
Mashonaland South	170	—	—	—	85	441	—	18	27	120
Manicaland	12	693	—	—	130	947	—	12½	66	94
Midlands	91	36	29	20	204	151	—	—	856	5,424
Matabeleland	100	201	8	5	34	283	—	—	4,234	654
Victoria	714	4,283	40	60	1,439	3,140	23	310	2,223	5,036
TOTAL	917	5,383	77	85	1,984	5,176	23	421½	7,406	11,416

TABLE 6.—GRAZING MANAGEMENT EXTENSION

Province	*Acreage of Grazing Land under Management*
Mashonaland North	32,809
Mashonaland South	11,700
Manicaland	—
Midlands	2,576
Matabeleland	74,266
Victoria	181,069
TOTAL	302,420

TABLE 7.—PURCHASE AREA EXTENSION

APPENDIX X—*continued*

Province/District	Total Acreage	Number of Farms Alienated	Number of I.C.As. and Agricultural Committees	Staff (Full Time—F.T., Part Time—P.T.) E.Os.	Staff (Full Time—F.T., Part Time—P.T.) E.As.	Number of Farm Plans Prepared	Number of Farm Plans Implemented	Number of Farms Adequately Protected	Number of Farmers Practising Grazing Management
Mashonaland North									
Chesa East	120,000	320	2	1 (F.T.)	9	5	5	—	—
Chesa West	78,300	289	1	—	8	14	14	—	—
Karugana	—	68	1	—	—	4	4	—	—
Chitomborwizi	77,000	351	3	1 (F.T.)	8	—	—	—	—
Zowa	63,800	230	2	½ (P.T.)	6	—	—	—	—
Nyahapupu	55,200	101	1	—	2	—	—	—	—
TOTAL	394,300	1,359	10	2 (F.T.) ½ (P.T.)	33	23	23	—	—
Mashonaland South					2 A.Es.				
Macheke	295,900	600	1 I.C.As.	1½	10 E.As.	1	—	390	20
Marandellas	18,446	109	3 I.C.As. 1 A.C.	2	3	3	—	50	67
Gatooma	157,000	550	4	—	11	1	1	450	175
Salisbury S.W.	24,464	135	3 I.C.As.	½	F.T.	1	—	11	2
TOTAL	495,810	1,394	12	4	26	6	1	901	264
Manicaland				1 (F.T.)	1 A.E.				
Rusape	152,565	634	7	3 (P.T.)	16 E.As.	4	3	634	158
Headlands	17,880	51	—	1 (P.T.)	1 E.A.	—	—	17	—
Eastern	79,652	612	4	2 (F.T.) 1 (P.T.)	1 A.E. 11 E.As.	3	—	379	9
TOTAL	250,097	1,297	11	3 (F.T.) 5 (P.T.)	2 A.Es. 28 E.As.	7	3	1,030	167
Midlands			3 I.C.As.						
Gwelo—Que Que	479,417	434	1 A.C.	2½	6	3	1	145	17
Charter	481,335	839	2 I.C.As.	5⅔	26	40	40	131	3
Tokwe—Belingwe	20,100	64	—	1	2¼	—	—	60	—
TOTAL	980,852	1,337	6	9⅙	34¼	43	41	336	20
Victoria			4 I.C.As.	1 (F.T.)	11 (F.T.)				
Northern	179,123	593	3 I.C.As.	2 (P.T.)	1 (P.T.)	5	3	295	218
Central	256,742	956	8 I.C.As.	3 (F.T.)	16 (F.T.)	18	7	630	493
Southern	227,000	418	4 I.C.As.	1 (F.T.)	1 (P.T.) 8 (F.T.)	—	—	18	171
TOTAL	662,865	1,967	19	5 (P.T.) 5 (F.T.)	35 (F.T.) 2 (P.T.)	23	10	943	882
Matabeleland									
Shangani—Filabusi	111,041	321	1 I.C.As.	2 (P.T.)	7	1	—	30	—
Marula—Gwanda	128,159	154	1 I.C.A.	4 (P.T.)	6 (F.T.) 1 (P.T.)	—	—	109	—
Matetsi—Umgusa	72,463	330	2 I.C.As.	1 (F.T.) 2 (P.T.)	5 (F.T.) 1 (P.T.)	2	—	81	—
TOTAL	311,663	805	4	1 (F.T.) 8 (P.T.)	18 (F.T.) 2 (P.T.)	3	—	220	—

TABLE 8 (a).—TRAINING

Training Institute/ Regional Centre/ Provincial Headquarters	*Subject Matter of Course*	*Length of Course and Number of Courses*	*No. of Provincial, Group and Extension Officers Attending*	*No. of Agric. Supervisors and Extension Assistants Attending*
Institutes				
Alvord	Extension I	2 weeks (4)	5	101
	Extension II	1 week (2)	40	19
	Extension Asst. induction	4 weeks (1)	—	42
	Senior staff induction	2 weeks (1)	8	—
	Extension refresher	1 week (1)	5	38
	Livestock	1 week (1)	5	16
	Agronomy	1 week (1)	—	8
	Agronomy	1 day (1)	32	—
	Conservation (dams and weirs)	2 weeks (1)	—	21
	Planning	1½ weeks (1)	12	2
	Planning room assistants	4 weeks (1)	—	34
	Crop survey	3 days (10)	—	104
Kayisa	Extension asst. induction	12 weeks (1)	—	37
	Young Farmers' Club	2 days (1)	9	9
	Extension refresher	3 days (1)	—	42
Msengezi	Veld and pasture	3 days (1)	—	12
	Extension asst. induction	3 weeks (1)	—	36
	Extension methods I	2 weeks (3)	—	68
	Burley tobacco	3 days (1)	—	21
	Young Farmers' Club	5 days (1)	—	20
	Fertilizer and cotton pests	1 day (1)	—	20
	Young Farmers' Club	2 days	—	13
	TOTAL	37 courses	116	663
	In addition to the above, the institutes have been the venues for: conservation courses for teachers, extension courses for home economist workers, conservation seminar for chiefs, livestock course for farmers, literacy and farming for Batonka tribesmen.			
Regional Centre				
Rowa	Extension asst. induction	4 weeks (1)	—	11
	Extension workshop	3 days (1)	21	—
	Young Farmers' Club	2 days (1)	4	15
	Beef	1 day (1)	16	—
	Horticulture	5 days (1)	12	—
	TOTAL	5 courses	53	26
Provinces				
Mash. North Group	Beekeeping	1 day (1)	8	—
Group	Extension methods	1 day (5)	12	99
Province H.Q.	Livestock	2 days (1)	7	—
Mash. North Province H.Q.	Soil Conservation	5 days (4)	10	64
	Livestock/Fertilizer	2 days (5)	4	36
Mrewa/Chitowa	Conservation	1 day (5)	—	14
	Burley tobacco	4 days (1)	—	9
	Cotton	4 days (1)	—	3
	TOTAL	23 courses	41	225
	GRAND TOTAL	5·7 days/ 65 courses	210	914

TABLE 8 (b).—MASTER FARMER TRAINING

Province	*No. of Farmer Training Centres*	*No. of Farmers Attending Master Farmer Training Courses*	*Other Training Provided (and Use of Centres for Community Activities)*
Mashonaland North	75	1,180	I.C.As. and Women's Clubs.
Mashonaland South	120	1,631	Women's Clubs, Field Days.
Matabeleland	188	2.592	Livestock Clubs, Master Farmer Clubs, Women's Clubs.
Victoria	150	4,023	Livestock Clubs, Master Farmer Clubs, Women's Clubs.
Midlands	52	1,171	Livestock Clubs, Master Farmer Clubs, Women's Clubs.
Manicaland	77	1,244	Women's Clubs, Y.F.C.
TOTAL	662	11,841	

GROUP AND EXTENSION OFFICERS YEARLY SUMMARY OF WORK IN HOURS BY PROVINCES
(OWING TO REORGANIZATION THIS IS NOT A COMPLETE RECORD FOR 12 MONTHS—UNIFORM.)
(COLLECTION OF FIGURES WAS ONLY ACHIEVED FROM JANUARY, 1964.)

Province	Mashonaland North	Mashonaland South	Manicaland	Midlands	Victoria	Matabeleland	Totals	**Percentage	Grand Total
I.C.A. Group: Farmers	3,602	2,522	1,811	1,884	1,220	1,777	12,816	18·13%	49,260
Staff Conferences	2,646	2,243	1,957	2,801	1,496	2,532	13,675		
Courses	5,948	4,720	3,338	3,503	1,966	3,294	22,769		
Inspections	2,024	2,325	1,643	1,959	1,284	2,521	11,756	4·33%	11,756
Agronomy	3,620	3,224	3,767	3,544	2,110	3,487	19,752	43·87%	119,202
Tobacco	4,406	3,598	4,804	2,719	761	1,927	18,215		
Livestock	1,291	2,951	2,921	3,968	2,060	5,445	18,636		
Soil and Water Conservation	10,493	8,181	5,174	3,297	731	2,628	30,504		
Irrigation	979	1,366	2,964	1,083	567	2,878	9,837		
Farm Planning	6,298	4,975	1,329	2,661	844	3,686	19,793		
Farm Management	1,021	618	172	251	209	194	2,465		
Field Days, Shows	2,947	2,881	1,636	1,383	814	1,698	11,359	14·89%	40,478
Field Trials	1,915	2,322	1,417	1,000	827	2,041	9,522		
Agricultural Census	385	455	139	456	489	128	2,052		
General Extension Liaison only	3,284	3,146	2,264	4,131	1,393	3,327	17,545		
Office Administration	9,481	11,197	7,793	6,771	2,605	9,414	47,361	18·78%	51,030
Publications	1,037	1,069	509	430	264	460	3,769		
Time Worked	61,337	57,793	43,638	41,841	19,640	47,437	271,726	100%	271,726

** Grouped functions expressed as a percentage.

Department of Veterinary Services Report

for the period 1st December, 1963 to 30th September, 1964

GENERAL

Following the dissolution of the Federation and the reversion of the Department to Territorial status, a major staff crisis eventuated as from 1st December, 1963.

The Director was granted abolition of office on medical grounds on that date and six of the most senior veterinary officers elected to leave the service.

On 30th September, 1964, the staff position was:

Departmental Establishment: 40 veterinary surgeons

Permanent transfer status	18 veterinary surgeons
Provisional transfer status	7 veterinary surgeons
Short-term contract status	4 veterinary surgeons
Vacancies	11 veterinary surgeons

The expected addition of newly qualified veterinary surgeons under the Governmental bursary scheme did not materialize. All legal requirements as to their compulsory return to service in the country became null and void with the disappearance of the Federation and they mostly elected to go elsewhere.

The Field Branch suffered most severely but the Research Branch lost two officers and failed to fill the three specialist vacancies carried over from last year.

In the Tsetse and Trypanosomiasis Branch the Assistant Director elected to resign and vacancies for three senior and four junior entomologists existed as at 30th October, 1964.

Lay staff was similarly unsettled by political eventualities and 22 animal health inspectors out of a total of 91 resigned; many were highly trained senior staff that the service could ill afford to lose. It speaks volumes for the tireless devotion of the remaining staff that no essential duty was left undone and that despite the shortages all disease control was maintained at a very high level despite certain threatening situations.

The return in May, 1964, of the six students sent to Glasgow for meat inspection training and qualification filled our establishment in this respect for the first time in many years.

A summarized report of the work of all branches follows but the customary full reports of the three responsible assistant directors will be dispatched in full to all the regular recipients of our annual report.

LIVESTOCK ECONOMY

In 1904 the livestock economy of the country was at its lowest ebb. Frozen and preserved meat to the value of £48,000 had to be imported. The country had suffered severe decimation from rinderpest at the turn of the century from which it was slowly recovering.

Contagious bovine pleuro-pneumonia was still occurring and African coast fever was exacting heavy losses on a widespread front.

The Secretary of the Agricultural Department stated in his annual report, 1904, that "until some effective means of combatting African coast fever is found, the question of restocking the country with cattle appears to be quite impracticable".

Rinderpest, pleuro-pneumonia and finally African coast fever were duly eradicated by the Veterinary Services with an ever-strengthening control of disease, and a sound cattle industry was established.

This has been reflected by cattle statistics over the last six decades.

ANNUAL CATTLE CENSUS

Year	*African Owned*	*European Owned*	*Total*
1904	94,544	30,369	124,913
1920	774,000	773,000	1,547,000
1940	1,636,000	826,000	2,462,000
1964	2,225,273	1,626,762	3,825,035

In the four Cold Storage Commission-controlled abattoirs in the year ending 30th June, 1964, 52,834 long tons of beef were produced, of which 9,724 long tons were exported as follows:

EXPORTS

Country	*Chilled (long tons)*	*Frozen (long tons)*	*Edible Ofals (long tons)*	*Total (long tons)*
Great Britain . .	4,665	1,973	567	7,205
Italy	135	1,455	10	1,600
Switzerland . .	52 (Air lift)	464	44	560
West Germany .	—	202	11	213
Mauritius . . .	—	125	21	146
TOTAL . .	4,852	4,219	653	9,724

In addition £1.75 million worth of canned beef products, meat extract, etc., were exported by Messrs. Liebig's (West Nicholson).

The export markets have been secured and held by the guarantee of the maintenance of a vital full staffed veterinary service with satisfactory control of disease in the field and the highest standard of meat inspection and hygiene in our abattoirs. With the present world shortage of veterinary surgeons and meat inspectors our resources are being severely strained in maintaining the required standards, and a drive by Government to make service conditions competitively attractive is a necessity in the immediate future.

The urgent impetus for increased beef production must be backed by an expanded field service, especially in regard to extension services in the Tribal Trust Land, for the control of the common erosive factors such as low fertility, helminthiasis, etc.

Control measures in respect of certain zoonoses, e.g. tuberculosis, contagious abortion, etc., have reached such significant proportions as to fully justify early eradication programmes for which more staff would be essential.

To date, despite staff losses following the break-up of Federation, the high efficiency of the service has prevailed and even improved, especially with the build-up of young Rhodesian professional staff, with a modern approach, devoted to the future of the live-stock industry of their country.

Sheep and goats have increased in a similar proportion to cattle, especially in the Tribal Trust Land, and offer an easily developed source of increased cash income to our emerging areas, which would demand veterinary extension service in health maintenance.

The Colcom Factory at Salisbury, dealing entirely with pig products, has created an export flow to the Near East of bacon, small goods and tinned meats that augurs well for the future. A survey of our pig population by a European expert revealed an absence of any enzootic decimative disease.

A poultry disease survey of the country was effected this year which demonstrated an overall low incidence of disease morbidity and/or mortality justifying full development of poultry production within the Tribal Trust Land.

DISEASE FACTORS

Foot-and-Mouth Disease

The discovery of a small localized infected centre in February, 1964, broke a spell of freedom that had lasted since September, 1962. On a Matabeleland ranch, mixing of weaner heifers with a game population that had shown infection in 1962, produced 30 per cent.

Foot-and-Mouth control game fence, Sabi-Limpopo P.E.A. border.

infection of cattle within 10 days, typed as S.A.T.II. The majority of cattle having had the same type infection in 1962, the main mass of adults were still highly immune and calves had a high grade passive immunity up to six months of age, making virusing of susceptibles in a central concentration with the perimeter held by immune stock a highly advantageous procedure under customary zoo-sanitary control.

No spreads occurred and all restrictions were lifted by June, 1964.

The game-proof fence between the Sabi and Limpopo rivers on our south-eastern border was completed, with the financial assistance of the Moçambique Government, in December, 1963.

It proved the main control factor in stopping spread from adjacent foot-and-mouth disease outbreaks in Moçambique in the first six months of 1964.

All other foot-and-mouth control fences, game and cattle, have been fully maintained and their value cannot be overstated.

African Swine Fever

The area reported as infected in 1962–63 and dealt with by slaughter and incineration has been restocked under control with no recurrence of disease.

Rabies

Double compulsory vaccination (three months and one year of age) of dogs has been maintained throughout the country at a satisfactory level. Our eastern border vaccinates are

g maintained on a reinoculation booster programme at the end of a three-year period h the date of the last vaccination, as this area is our high-challenge zone wherein tically all cases occur. Marking of vaccinates with a persistent yellow dye across the p and on the tail has greatly facilitated check in areas of low production of dogs with ltant ten-fold rise in effective vaccination.

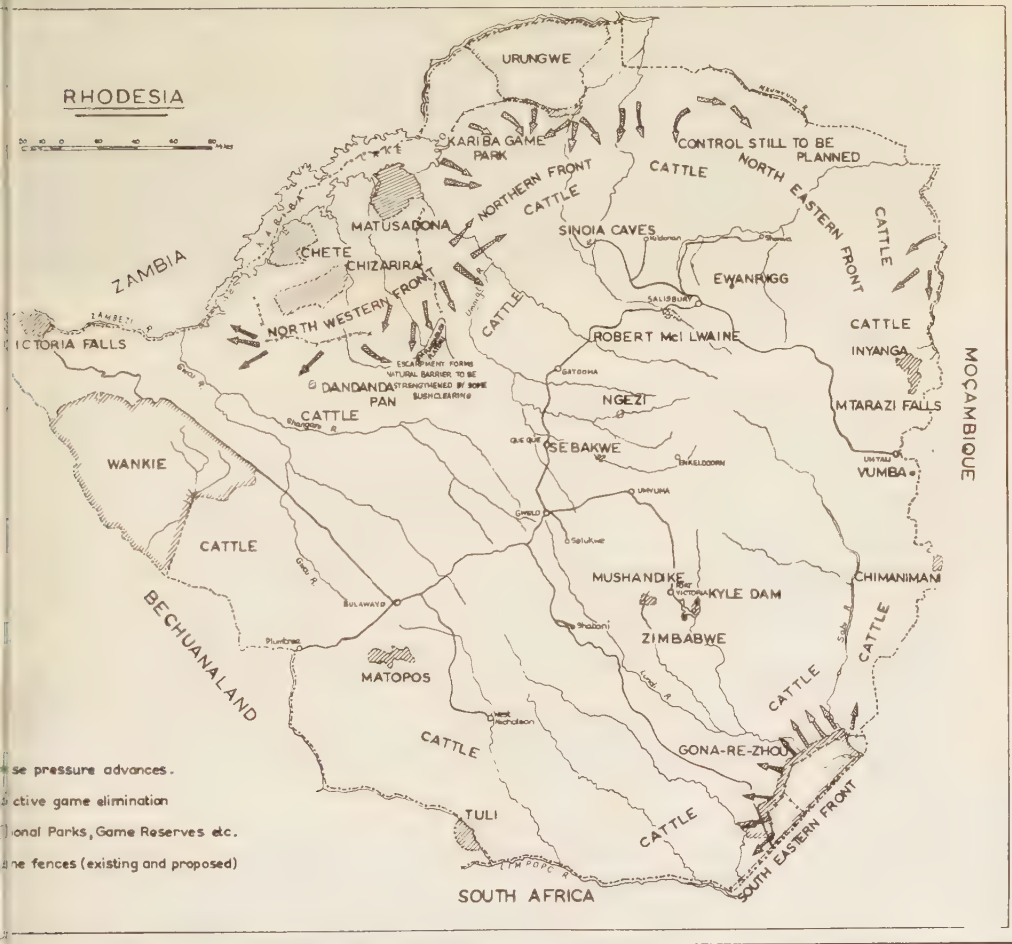
Twenty-one positives (one human, four vaccinated and 16 unvaccinated stray dogs) were rded in the prone eastern border areas.

Theileriosis

A slow build-up of sporadic incidence of this disease (38 outbreaks with 348 deaths in year) led to the decision to proclaim the whole country as a compulsory dipping area the year round to eliminate the tick build-up in the previously permitted non-dipping od in winter each year. Due provision has been made for exemption from dipping on ifiable grounds in the winter period (poverty, drought, etc.).

Tsetse and Trypanosomiasis Control

Major control measures of bush clearing, spraying of residual insecticide and prophyic drug regimes in cattle failed to hold back the advance of tsetse fly. An overall grave



deterioration of control with return of tsetse fly to areas that had been free from 1930, developed on the northern and south-eastern perimeters of the country, plus a threatening spread on the western front to the environs of the Wankie National Game Park.

Within five and a half years of the cessation of shooting of free living wild life as a tsetse control measure the tsetse fly situation had reverted to that existing in 1928, although modern drug usage had averted the mortalities and indeed had largely increased the number of stock held in fly areas, thus camouflaging the seriousness of the spreads.

Recalcitrant owners of stock who refused to produce cattle for regular prophylaxis with the resulting emergence of drug-resistant trypanosomes soon created a situation where reversion to a modified elimination of the main feed sources of tsetse fly was completely unavoidable.

The deterioration of the situation is obvious from the following statistics:

	1955–66	*1963–64*
Cattle at risk	46,000	248,801
Smears	23,028	66,423
Inoculations	47,126	125,298
Infection	0.9%	6.5%

In view of the proven efficacy of wild life destruction as a control measure in the period of 1930–1950, which cleared some 10,000 square miles of tsetse fly, and the complete breakdown in control of fly since shooting had been abandoned in the early 1950s it was obvious that we had to revert to the removal of the selected hosts of tsetse from country bordering agricultural areas and the maintenance of the cleared area free of these animals.

Fly control based on a gross expenditure at an average rate of £25,000 per annum in the past decade in bush clearing, riverine vegetation clear felling and residual insecticidal sprays, both aerial and manual, had utterly failed to even hold the situation but led to major spreads of tsetse fly.

Continued analysis of tsetse fly blood meals had clearly demonstrated the preferred hosts of the tsetse fly as here set out.

Host Species		*Indentifications*	*Total*	*Per cent.*	
Wart-hog	Suidae	168		22·5	
Bush pig	Suidae	2		0·3	
Wart-hog or bush pig	Suidae	314	484	42·0	64
Kudu	Bovidae	26		3·5	
Bushbuck	Bovidae	42		5·6	
Bushbuck or kudu	Bovidae	18		2·4	
Bushbuck, kudu or eland	Bovidae	3		0·4	
Eland	Bovidae	2		0·3	
Roan	Bovidae	1		0·1	
Impala	Bovidae	2		0·3	
Unidentified bovid	Bovidae	97	191	12·9	25·5
Rhinoceros		12		1·6	
Man		6		0·8	
Baboon		1		0·1	
Unidentified primate		26		3·5	
Cat		1		0·1	
Antbear		2		0·3	
Avian		25		3·3	
		748		100·0	

rypanosomiasis inoculation. New type race, permanent all steel gives efficiency and speed.

The favoured hosts were found to be wart-hog and bush pig in the main with kudu and ushbuck predominating in the antelopes.

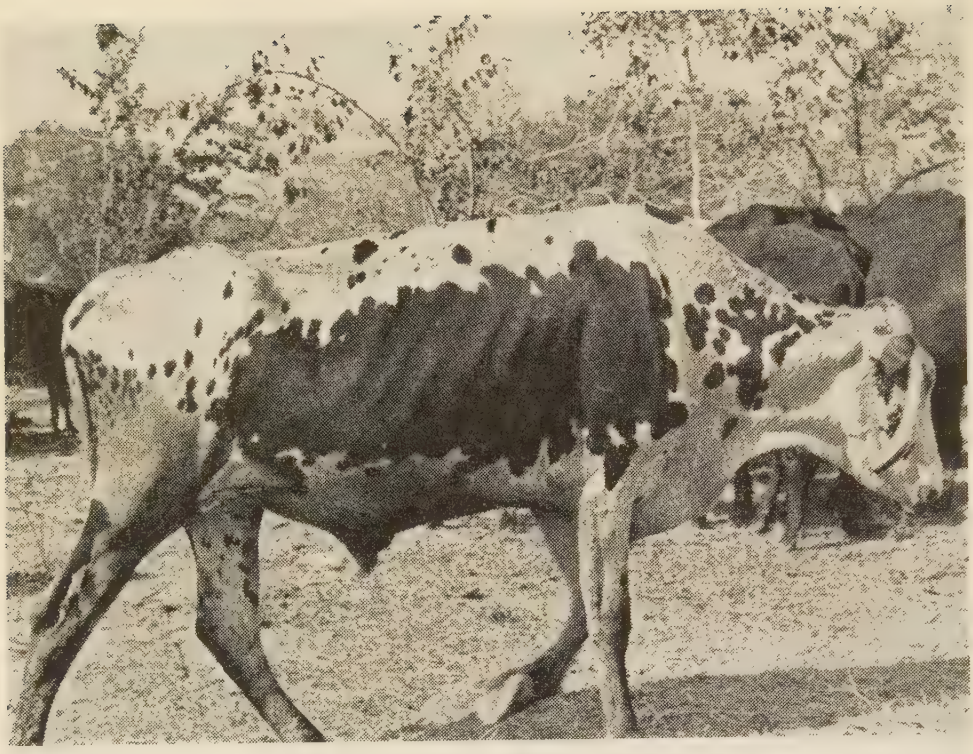
A grave threat of invasion of tsetse fly into the Wankie National Park existed in 1963 espite major measures in spraying, bush clearing, river bank stripping, etc., costing approxiately £200,000, having been effected in the adjoining fly-infested areas.

An area of 200 square mile containing the main breeding focus of fly was first cleared f elephant and buffalo and surrounded with a 12-strand game-proof fence. The enclosed rea was then vigorously cleared of wart-hog, bush pig, kudu and bushbuck.

The graph (fig. 1) clearly demonstrates the drastic collapse of the tsetse population in elation to the kill.

The trypanosomiasis incidence in the cattle in adjoining Tribal Trust areas declined milarly, as portrayed by the incidence graph (fig. 2), and since then cases have practically eased.

A comparative control exercise in the south-east corner of the country, where a major dvance had been widely fought on an international co-operative basis involving the Republic f South Africa, Province of Moçambique and Rhodesia, clearly demonstrated that if the se of all other measures was not supplemented by wild life elimination then only a temorary stemming of the tsetse fly advance was secured.



Trypanosomiasis — Typical "Ngana" case.

Accordingly, despite marked adverse public clamour, a policy of selective wild life elimination has now been implemented as an overall policy combined with bush clearing, erection of game fences, residual insecticidal spraying, use of sanative drugs and traffic control as in the past.

The areas wherein shooting will take place, as shown in the Map, are districts wherein destruction of game by resident and newly introduced populations will make the continued existence of the wild life population almost impossible.

The overall number of wild life eliminated will be very small compared to the number shot in the 1930–1950 period and full economic utilization of all carcasses, skins, etc., is being made in conjunction with the Department of Wild Life Management.

Active research into the biology of the tsetse fly and of trypanosomiasis is being pursued at Lusulu, Rekomitjie and Salisbury research station.

Other subjects under constant survey and research are biometry of trypanosomes, trypanocidal drug trials, investigation of drug resistant strains of trypanosomes, immunity to trypanosomiasis, trypanosomiasis in free living wild life, trypanosomiasis in sheep, goats and pigs, and mechanical transmission of trypanosomes.

The addition of an F.A.O. scholar in immunological studies has greatly advanced our research programme.

Complimentary research promoted by the Agricultural Research Council is actively proceeding in respect of—

(a) sterilization of male tsetse fly by radio-mimetic drugs (Salisbury Research Station);
(b) resting tsetse fly surveys and pupal deposition surveys (Lusulu Research Station);
(c) biology of tsetse fly (University College of Rhodesia and Nyasaland).

Tuberculosis

The past record of the incidence persisted.

Dairy Herds

Sustained testing of approximately 45 per cent. of dairy herds showed a slight rise in incidence from 0.19 per cent. in 1962–63 to 0.24 per cent. in 1963–64. This was due to the inclusion of one new test herd, after a continued incidence of glandular infection in pigs and whey on the premises had been demonstrated in the abattoirs.

Meat Inspection Incidence

Generalized Tuberculosis

Total cattle slaughtered	274,821
Total condemnations	13
Incidence, per cent.	0.005
Total pigs slaughtered	106,018
Total condemnations	12
Incidence, per cent.	0.011

Overall Incidence (generalized and partial condemnation)

Abattoir	*Cattle Totals*	*% Incidence*
Bulawayo	22 head in 107,121	0.021
Salisbury	13 head in 111,293	0.012
Fort Victoria	16 head in 48,637	0.032
Umtali	Nil head in 7,770	Nil

Tuberculosis in pigs, confined to the head, is not uncommonly found in African-owned pigs and is probably due to infection with the human type of tubercle bacillus from their close contact as village line scavengers.

Tuberculosis in poultry was demonstrated for the first time in the annals of the Department and is now under active investigation.

Anthrax

One small confined outbreak in the Inyati District was speedily controlled, with one death only. A total of approximately 4.000 head was compulsorily vaccinated. This is the first outbreak since late 1961.

General

No other major decimative disease occurred, the usual sporadic losses being diagnosed from redwater and gallsickness in cattle, bowel oedema in pigs and enterotoxaemia in sheep, etc.

Loss of stock from poisoning by toxic materials (cattle dips, fertilizers, crop sprays, etc.) underlined the widely overlooked legal duties of custodians of such materials to maintain them securely under lock and key.

Major extension drives to avoid the morbidity and/or mortality from the minor erosive factors of nutrition infertility, helminthiasis, etc., were promoted but were largely offset by wide-spread drought in the southern half of the country where heavy poverty deaths unfortunately occurred.

Overall control in the Tribal Trust Land has been prejudiced by incipient political resistance, but the position was improving towards the end of the year.

The major customary control inspections of stock throughout the country have been maintained at a high level despite staff shortages, etc., and the position remains generally sound in respect of freedom from disease.

Fig. 1

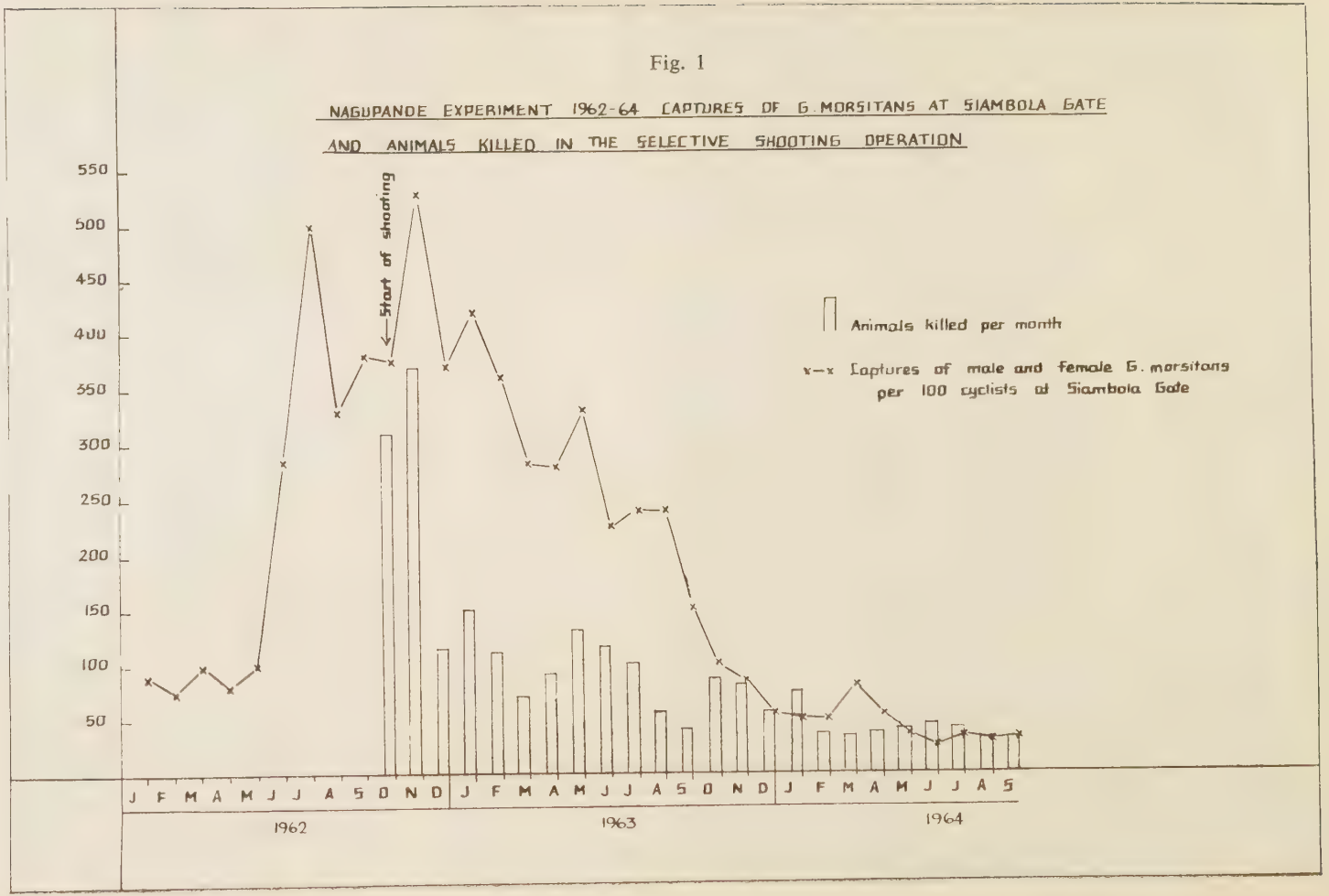
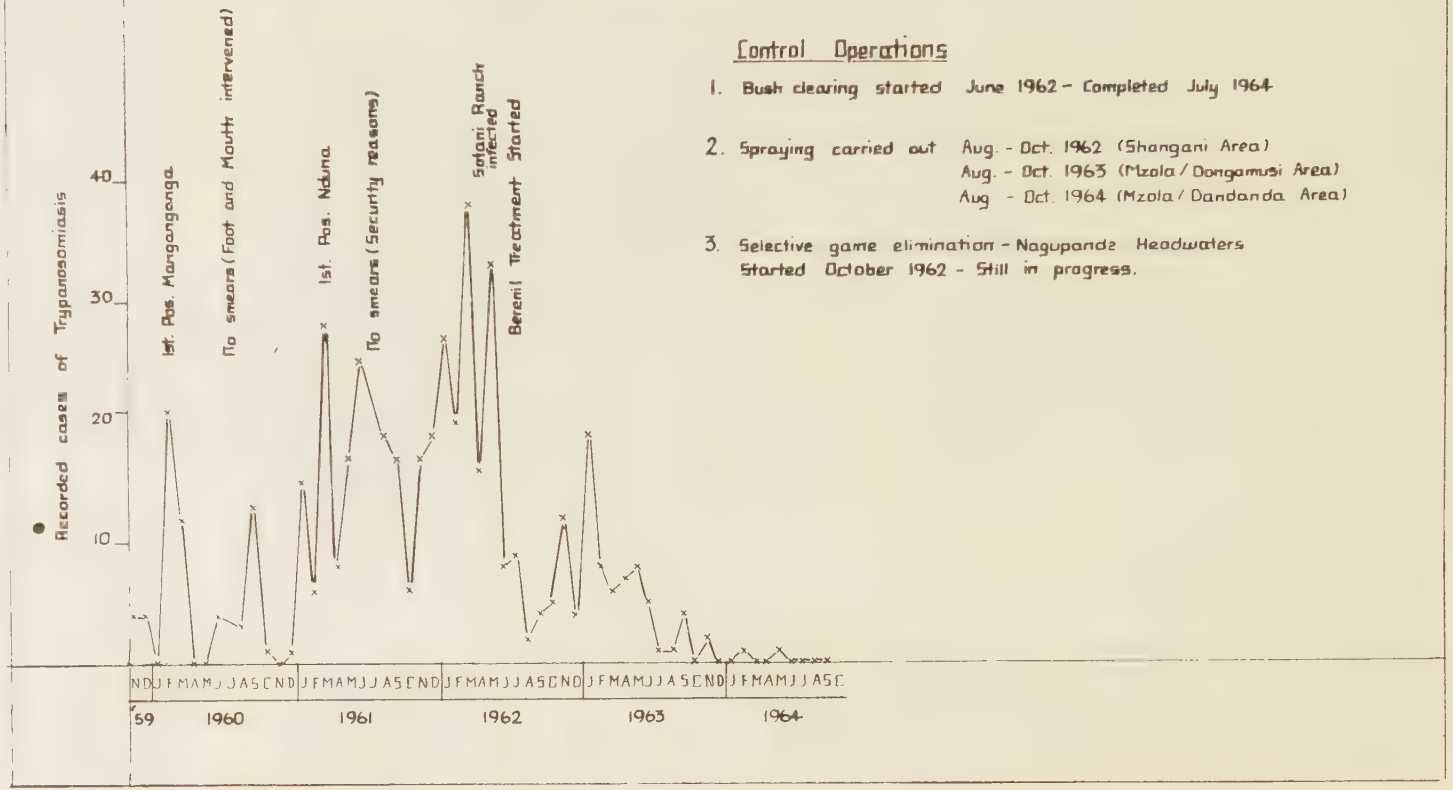

NAGUPANDE EXPERIMENT 1962-64 CAPTURES OF G. MORSITANS AT SIAMBOLA GATE
AND ANIMALS KILLED IN THE SELECTIVE SHOOTING OPERATION
550
500
450
400
350
300
250
200
150
100
50
Start of shooting
Animals killed per month
x—x Captures of male and female G. morsitans per 100 cyclists at Siambola Gate
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S
1962
1963
1964

Fig. 2

TRYPANOSOMIASIS IN AFRICAN OWNED CATTLE - LUPANE DISTRICT

(Japiwa, Tjotjolo North, Sebendhle, Manganganga, Tjotjolo South and Nduna dips only).


Recorded cases of Trypanosomiasis
40
30
20
10
1st. Pos. Manganganga
No smears (Foot and Mouth intervened)
1st. Pos. Nduna
No smears (Security reasons)
Safari Ranch infected
Berenil Treatment Started
N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O
'59
1960
1961
1962
1963
1964

Control Operations

1. Bush clearing started June 1962 - Completed July 1964

2. Spraying carried out Aug. - Oct. 1962 (Shangani Area)
   Aug. - Oct. 1963 (Mzola / Dongamusi Area)
   Aug - Oct. 1964 (Mzola / Dandanda Area)

3. Selective game elimination - Nagupanda Headwaters
   Started October 1962 - Still in progress.

MEAT INSPECTION

Inspection

Total animals slaughtered in Government-controlled abattoirs from which exports are derived:

	Cattle	*Sheep*	*Goats*	*Pigs*
Salisbury	111,293	12,582	597	65,880
Bulawayo	107,121	20,130	1,958	31,187
Fort Victoria	48,637	1,358	—	6,997
Umtali	7,700	2,477	66	1,954
TOTALS	274,751	36,547	2,621	106,018

Total Carcase Condemnations (any cause)

Cattle, 0.8 per cent. Goats, 0.03 per cent.
Sheep, 0.04 per cent. Pigs, 1.2 per cent.

The high percentage in pigs is due to measles condemnations particularly in African-owned pigs. Of a total of 1,295 pig carcasses condemned 1,062 were condemned for measles.

Specific Condemnation Factors of Interest

BEEF MEASLES

	Slaughtered	*Condemned*	*Detained for Freezing*	*Percentage Incidence*
Cattle . .	274,751	616	3,710	1·5
		cf.	1962–63	1·6

PORK MEASLES

	Slaughtered	*Condemned*	*Percentage Incidence*	
Pigs . . .	106,018	1,062	1·0	
		cf.	1962–63	0·4

TUBERCULOSIS

	Generalized	*Generalized and Partial*
Cattle . .	0·005%	0·018%
Pigs . . .	0·011%	

TRAUMA IN TRANSIT (Bruising, etc.—Total condemnations)

Cattle	*Sheep and Goats*	*Pigs*
132	6	6
0·048%	0·015%	0·059%

HYDATIDOSIS

Cattle		*Sheep and Goats*		*Pigs*	
Lungs	*Liver*	*Lungs*	*Liver*	*Lungs*	*Liver*
2,903	122	1	—	1	—

Proportional relation of lung infection to liver infection in cattle . 27 to 1
Percentage bovines slaughtered with lung hydatidosis . . . . 1·0%

This represent not an increase in incidence but an increase of record of these cysts due to an improved system of inspection forced upon us by the parasitologist's demonstration of the very high percentage of infectivity of these cysts (nine out of 10 fertile).

These cysts are mainly derived from free-living carnivores (jackal, hyaenas, etc.) and not from the domestic dog. Hydatidosis has never been recorded in the human in Rhodesia.

TRICHINOSIS

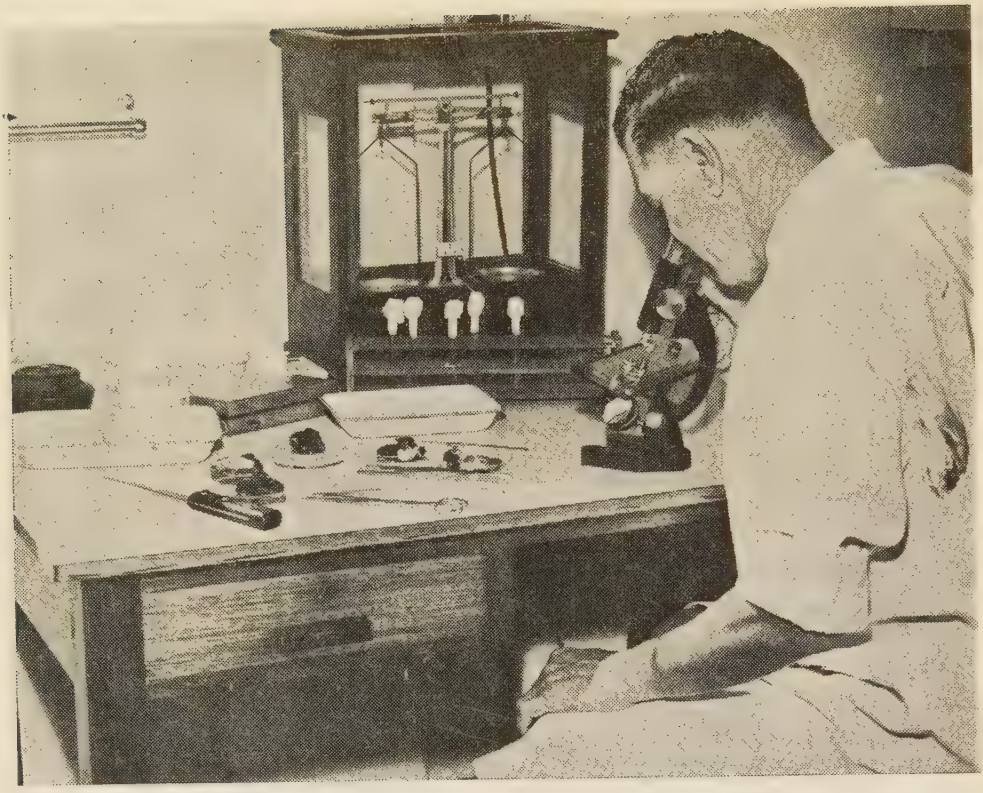
A major check of pig carcasses over the year has failed to reveal any positive case in 1,450 samples from the slaughter floor.

Meat inspection, Cold Storage Commission, Salisbury.

General

Major improvements in regard to all aspects of handling of stock in lairages, overall abattoir practice in hygiene and preparation of carcasses, modernization of abattoirs, etc., has been effected by the Senior Meat Inspection Adviser in close collaboration with the Cold Storage Commission, and an extremely high standard of hygiene production is being achieved.

Constant checks from a laboratory sited on the slaughter floor are now in practice in one abattoir and will gradually be extended to all abattoirs.



Slaughter floor laboratory, Cold Storage Commission, Salisbury.

IMPORTATIONS

	Republic of South Africa	*United Kingdom*	*United States of America*	*Bechuanaland Protectorate*	*Northern Rhodesia*
Bulls	77	4	3	103	—
Cows	9	—	19	1,191	293
Heifers	86	—	—	—	—
Calves	4	—	10	—	—
Oxen	—	—	—	7,269	—
Mixed	—	—	—	—	10
Mares	67	—	—	—	1
Stallions	42	—	—	—	—
Geldings	227	—	—	—	2
Mules	—	—	—	5	—
Sheep	119	—	—	6,084	112
Goats	—	—	—	402	—
Pigs	6	—	—	354	10

Cattle, 9,438; Equines, 344; Sheep, 6,196; Goats, 402; Pigs, 370.

EXPORTATIONS

	Republic of South Africa	Northern Rhodesia	Nyasaland	Bechuanaland	P.E.A.	Congo
ls	2	69	—	5	21	30
ws	44	76	—	—	49	—
ifers	—	61	—	—	67	540
lves	7	—	—	—	33	—
en	—	955	—	—	—	—
ked	—	127	—	—	—	—
ires	8	4	—	1	—	—
llions	4	3	1	—	—	—
ldings	38	41	—	—	—	—
nkeys	—	4	—	—	—	—
ep	—	27	4	—	70	—
s	—	18	—	—	18	—

Cattle, 2,086; Equines, 104; Sheep, 101; Goats, nil; Pigs, 36.

CATTLE CENSUS AND DIPPING TANKS

District	European	African	Total	Dip Tanks	Spray Races	Hand	Total
isbury	399,407	387,734	787,141	1,439	471	373	2,283
oia	124,466	56,442	180,908	386	99	125	610
anda	110,513	292,244	402,757	386	16	—	402
awayo	352,207	456,137	808,344	1,051	53	176	1,280
t Victoria	229,669	486,847	716,516	709	51	4	764
elo	286,613	309,919	596,532	987	81	49	1,117
ipinga	53,719	59,679	113,398	234	18	16	268
itali	70,168	176,271	246,439	469	81	80	620
TOTAL	1,626,762	2,225,273	3,852,035	5,661	870	823	7,344

CENSUS OF OTHER ANIMALS

District	Pigs	Sheep	Goats	Equines
isbury	43,206	90,116	42,706	8,830
oia	6,350	19,054	10,305	2,752
anda	3,337	44,052	90,029	34,111
awayo	17,180	89,065	213,578	29,492
t Victoria	7,257	53,953	69,347	482
elo	6,487	48,363	64,429	12,334
pinga	4,233	17,039	44,296	6,779
itali	7,482	23,212	27,916	1,839
TOTAL	95,532	384,854	562,606	96,619

RESEARCH BRANCH

Lack of specialist staff is still effectively blocking the full development of this wing, routine diagnostic services have been maintained at an efficient level, a total of 25,675 cimens for diagnosis being dealt with during the year.

Aflatoxicosis

No natural outbreaks of this condition were recorded but trials to determine the cts of feeding 20 to 25 per cent. infected groundnut cake at a level of 0.5 to 1 p.p.m.

in rations to all species of farm animals for a period of six months were carried out with animals being slaughtered from each group at one- to two-month intervals. All livers were checked microscopically.

No untoward effects were noted in pigs, calves and lambs.

Six of 22 turkeys died in the first six weeks from sub-acute aflatoxicosis. Remainder showed mild chronic non-progressive lesions on ensuing periodic slaughter. No ducks or chicks succumbed but after 62 days in duck and 153 days in chicks, lesions of chronic aflatoxicosis were detected and appeared to be slowly progressive to the end of the trial.

National Poultry Disease Survey

Sampling of 81 poultry flocks representative of commercial production, breeding flocks and African-owned flocks yielded the following statistics:

MYCOPLASMOSIS

	P.P.L.O. C.R.D. Complex	*B.W.D.*	*T.B.*	*Newcastle Disease*	*Infectious Bronchitis*	*Avian Encephalo-myelitis*
No. of flocks tested	80	38	22	80	60	39
No. of flocks positive	64	1	—	—	42	42
No. of flocks negative	16	37	22	80	16	7
Flocks positive	80%	2·6%	—	—	70%	82%

Newcastle disease was proven to be completely absent. A pattern of disease control is now being developed by the Avian Pathologist to meet the main disease factors now disclosed.

Preventative and Curative Services

Vaccines	1964	1963	1962
Anthrax vaccine	24,850	33,500	48,160
Bluetongue vaccine	13,350	14,900	9,850
Calf paratyphoid vaccine	8,289	9,160	7,795
Calf paratyphoid vaccine for use in adults	238	506	272
Contagious abortion vaccine	94,984	117,941	97,932
Brucella rev. a vaccine	400	660	—
Enterotoxaemia vaccine	47,770	35,700	19,400
Fowl pox vaccine	396,500	404,900	431,100
Gallsickness vaccine	13,340	17,655	22,670
Redwater/gallsickness vaccine	10,270	7,922	9,248
Horsesickness vaccine	6,001	5,713	6,062
Lumpy skin vaccine	1,174	1,829	145
Quarter evil vaccine	379,860	458,450	483,980
Quarter evil/malignant oedema vaccine	44,960	67,560	89,020
Rift valley fever vaccine	100	150	—
Lamsiekte vaccine	1,320	1,480	—
Lamb dysentry	900	—	—

Brucellosis in Dairy Cattle

A repeat milk-ring test of all milk consigned to the Dairy Marketing Board, Salisbury, again gave a 15 per cent. positive in the total herds supplying, as in July, 1963.

A detailed biological investigation of six of these herds which had given definite milk positives on both occasions, and two other producer-retailers with blood, milk and vaginal tampon tests was effected.

Conclusions arrived at were—

(a) vaccination of young stock at four to eight months of age with S.19 adequately controls the disease in cattle;

(b) immunity is, however, not solid and appears unable to withstand heavy challenge;
(c) even in carefully vaccinated herds latent infection in apparently normal cows can exist and cause no harm. Five of the six milk positive herds had only one or two infected animals harbouring latent infection;
(d) vaccination apparently reduces abortion rate even when it fails to protect the animal;
(e) if an eradication scheme is to be mounted in the country S.19 vaccination will have to be limited by law to calves under eight months of age, forbidden in adult stock, and compulsory vaccination of all beef and dairy calves introduced.

Fertility of Ranch Cattle

Further work on the early weaning at ±80 days resulting in greatly increased con-tion rates in the cows as opposed to late weaned cows showed that feeding in the dry son did not affect the results.

NCEPTION RATES

	Early weaned	*Late weaned*
Cows fed	100%	41%
Cows not fed	100%	0%

Early weaning gave calves an early set-back for about four months but they seemed to ke up lost ground by the yearling stage.

Further work in feeding of cows with calves at foot a high carbohydrate ration to induce reased conception yielded calves 40 to 50 lb. heavier than in non-fed dams. This was nbined with an early weaning trial but the unpalatability of the offered ration negatived trial.

Trial feeding of early weaned calves is being effected at another Government research tion with promising results.

The early weaning programme is now being widely tried on various ranches in the ntry.

ARTIFICIAL INSEMINATION

This service has not widened its scope since its inception, the actual inseminations owing an annual drop in recent years, *viz.*:

	1961–62	1962–63	1963–64
Semen doses . .	7,382	7,048	6,900

It has been obvious for years that private interests should promote this service if it is be used to its best advantage. This has now happened in Salisbury with the promotion many owners using their own inseminator and it is hoped that private enterprise will on gradually take over the whole of this service in the country.

The development of a deep-freeze technique, especially liquid nitrogen flasks, makes possible for farmers to store semen on their premises and practise artificial insemination their own herds.

The extension of the practice to commercial beef herds and the Tribal Trust Land is idually developing.

PARASITOLOGY

Larval cultures of nematodes from various species of antelopes were dosed to 31 sheep. e only nematodes which consistently established themselves in sheep were *haemochus* spp. d strains of this species derived from wildebeest and reedbuck are being maintained and died. Giraffe strains of *haemonchus* were similarly established and maintained in sheep.

One pregnant ewe died as a result of infestation with eland *haemonchus* and a non-egnant ewe similarly died with a giraffe *haemonchus* infestation.

Nematode egg counts in such game nematode infestations of sheep rose as high as ,000 eggs per gram.

In the light of these findings it would appear that the accepted principle of game para-es being host specific is open to doubt in this country as well as elsewhere in the African ntinent.

PUBLICATIONS

Published

Condy, J. B., "The Importation of Eight Square-lipped Rhinoceroses to Southern Rhodesia". *African Wild Life.*

Condy, J. B., "The Capture of Black Rhinoceros and Buffalo". *Rhod. Agric. Jnl. Res.*, vol. 2, no. 1.

In Press

Condy, J. B., "A Technique for Capturing Abdim's Stork". *The Ostrich*, journal of the South African Ornithological Society.

Ford, E. J. H., and Lawrence, J. A., "Hepatic and Serum Changes Following Repeated Administration of Small Amounts of Carbon Tetrachloride to Sheep". *Jnl. Comp. Path.*

Philip, J. R., "Chronic Respiratory Disease in Poultry in Rhodesia". *Rhod. Agric. Jnl.*

ACKNOWLEDGEMENTS

Tribute must be paid to the many other Government departments who have given highly supportive and active co-operation to us in our widespread varied activities.

The staff of all branches of the Department have shown a high sense of devotion of duty and acceptance of responsibility in very difficult times and it is noteworthy that so little interference with normal duties eventuated in times of severe political disruption.

Their loyalty and application is markedly commended.

T. LEES MAY,
Director of Veterinary Services.